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INTERNATIONAL Railway Journal

May 1961

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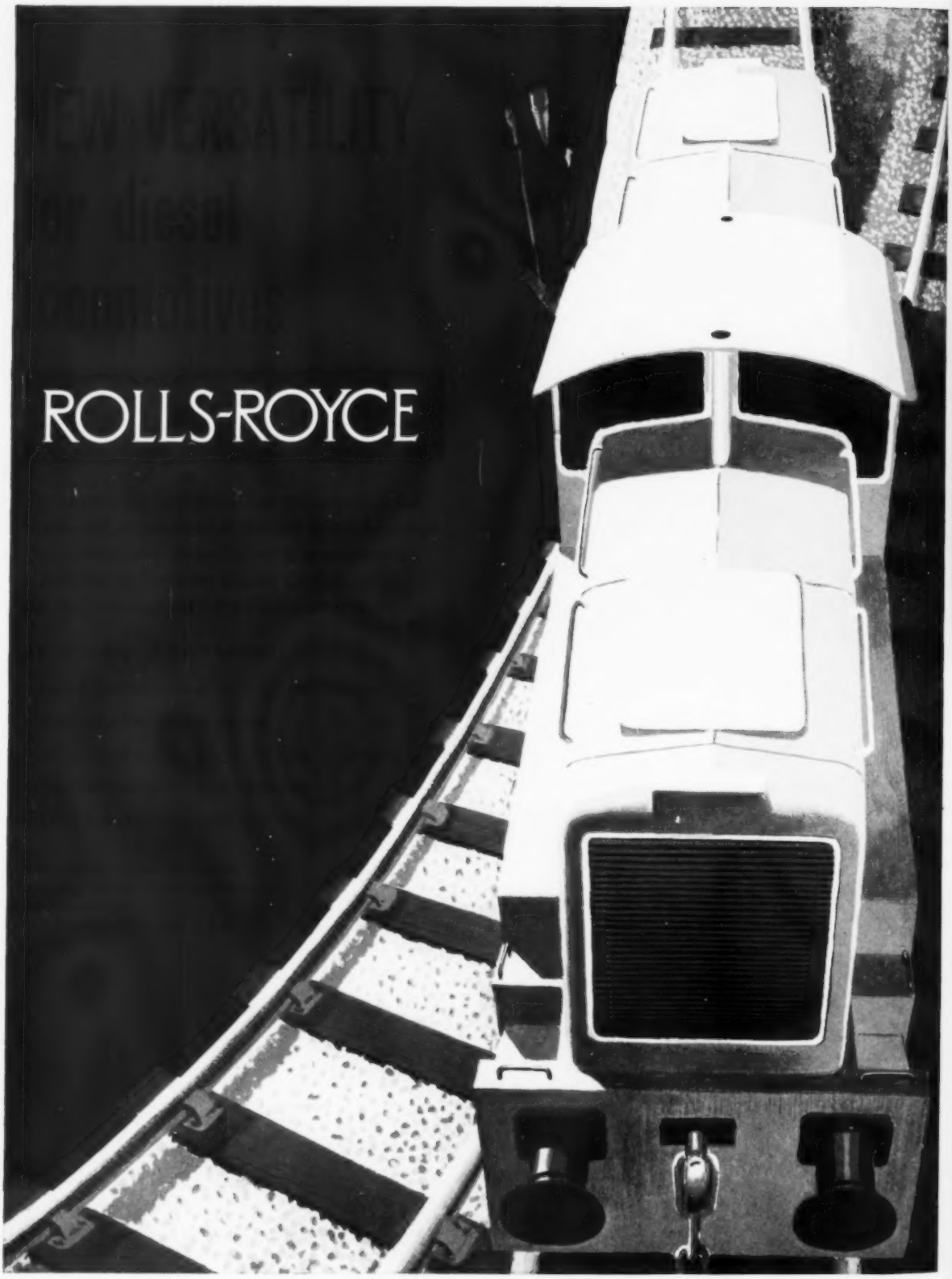

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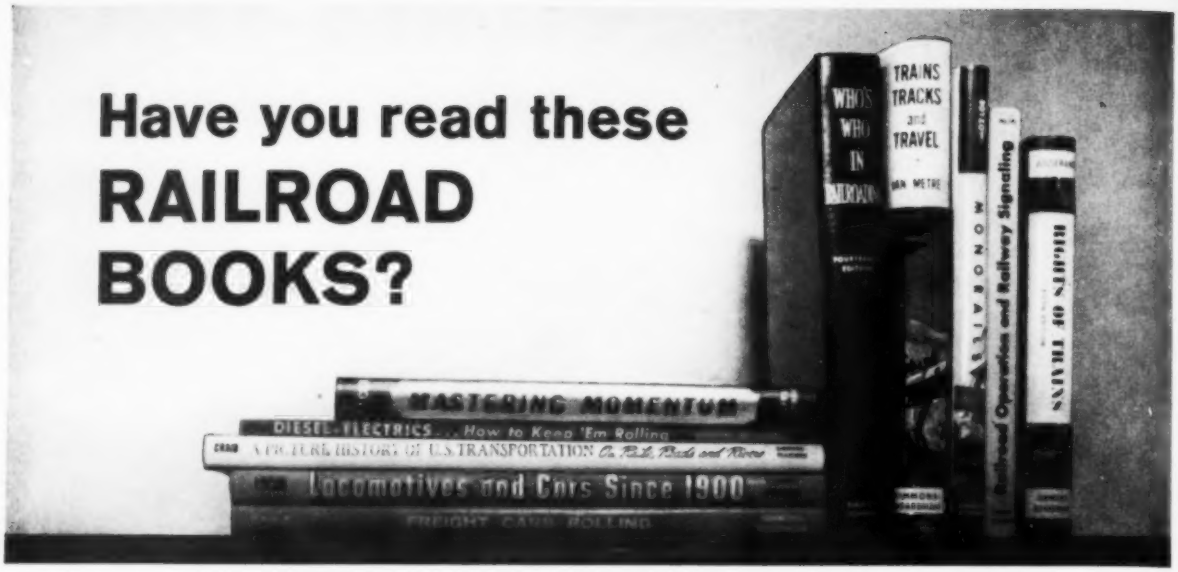
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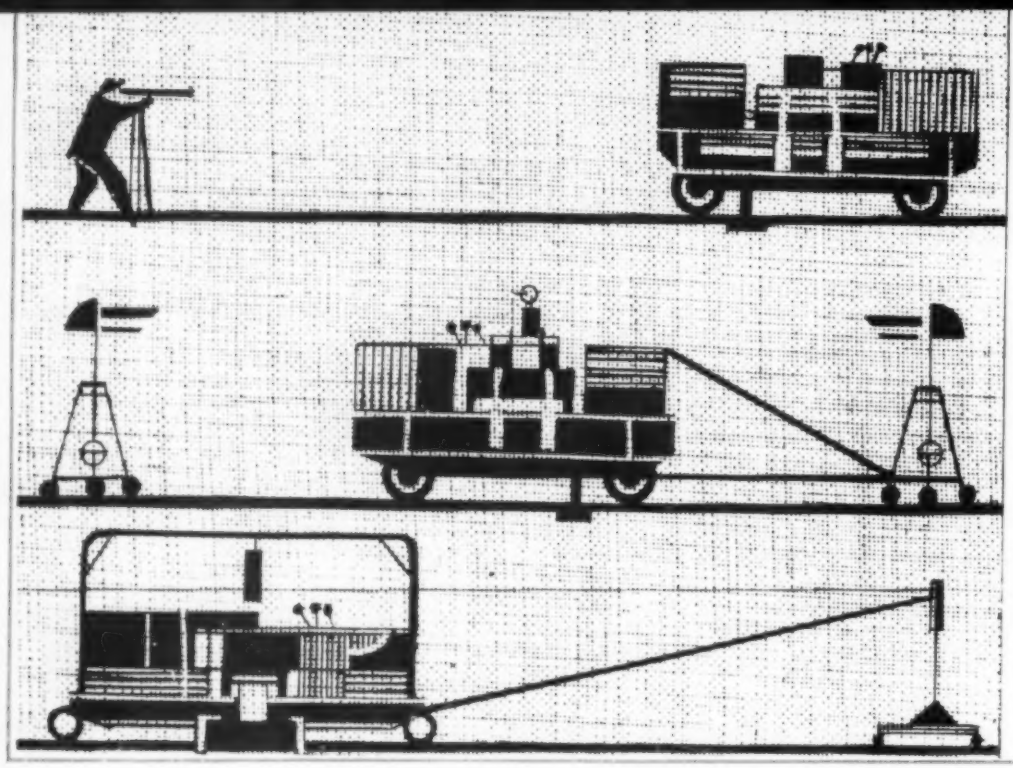

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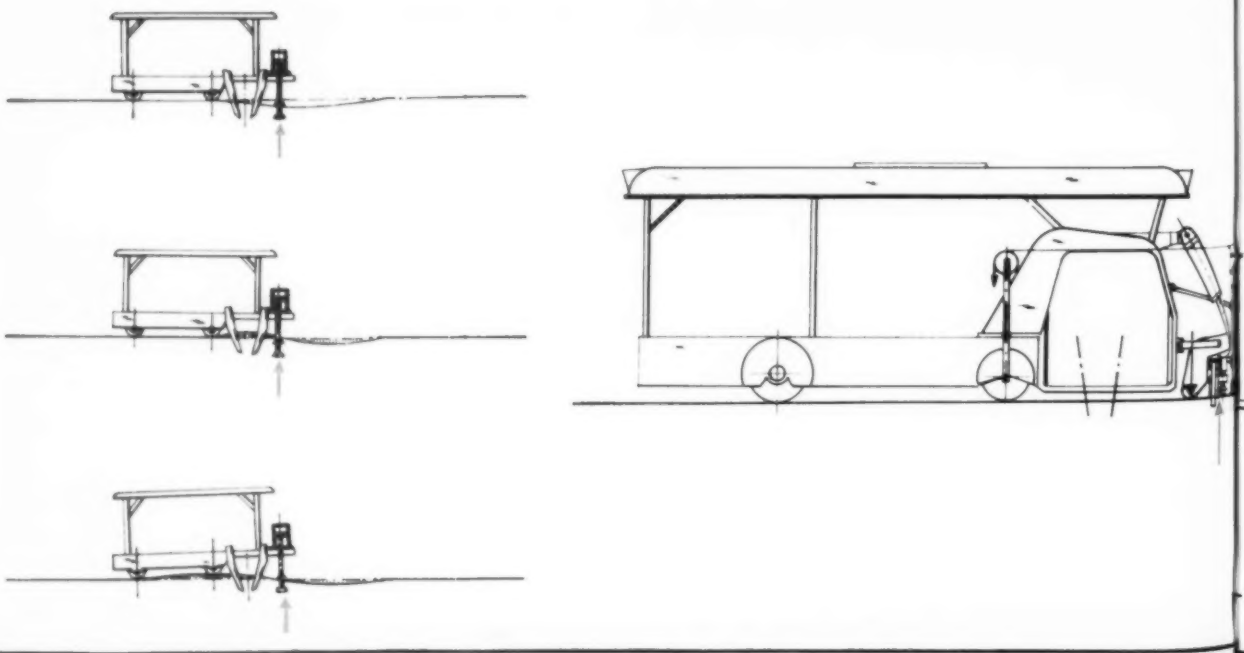

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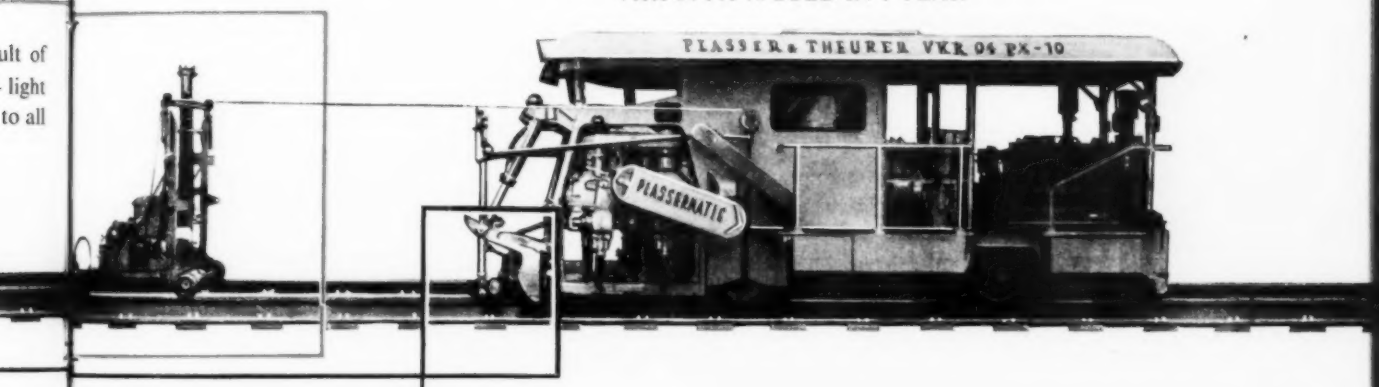

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RESUMEN

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INTERNATIONAL RAILWAY JOURNAL

World Market

▶ *British Railways (North Eastern Region)*—Have authorized construction of a modern, mechanized marshaling yard at Stourton, near Leeds. Planned to handle north-south traffic, the Stourton facility will handle from 3500 to 4000 cars a day. When completed, in about three years, it will replace 14 smaller existing yards.

▶ *Burma Railways*—Are asking bids by 31 May for 45 1000-hp and five 2000-hp meter-gauge diesel-electric locomotives. Specifications are available, at $14 per set, from the Commissioner of Railways, Bogyoke Aung San Street, Rangoon.

▶ *Egyptian Republic Railways*—Has recently received from Henschel-Werke GmbH, Kassel, West Germany, 30 Type AA-16 locomotives. Another 78 Type AA-12 locomotives are currently under production by Henschel.

Bids are invited until 7 June for supply and installation of VHF communications equipment, including 51 trackside stations of 10 channels each; 760 transmitter-receiver sets for use in locomotives; and one central control consisting of two 50-watt transmitters and two 50-watt receivers.

▶ *Hungarian State Railways*—Prototype passenger cars made largely of aluminum are to be constructed at the Hungarian rolling stock works at Raab (Györ). Dimensions of the cars will be similar to existing designs, but their tare weight is expected to be 23.2 metric tons, compared with 37 metric tons for all-steel cars. Following tests with the prototypes, it is expected the new lightweight cars will be built in quantity.

▶ *Indian Railways*—Four Japanese firms—Yawata, Fuji Steel, Nippon Steel & Tube, and Kawasaki Steel—took first place in bidding on 23,219 tons of an Indian Railway order for 25,845 tons of steel plate. A British firm was low bidder on the other 2626 tons.

Seven 650-hp diesel-hydraulic locomotives for India are under construction at the Kiel-Friedrichsort (Germany) plant of Maschinenbau Kiel Aktiengesellschaft. The rigid-framed units with rod drive are considered as prototypes for evaluation in connection with a diesel standardization program.

▶ *Jamaica Railway Corporation*—Metropolitan-Cammell Carriage and Wagon Co., Ltd., Birmingham, England, is building 17 diesel rail cars. The order includes 12 83-seat second-class cars and five with 20 first-class and 58 second-class seats plus small buffet sections for light refreshments. Each car will be powered by a Rolls-Royce six-cylinder engine with twin-disc transmission.

▶ *Kowloon-Canton Railway (British Section)*—Has ordered from Metropolitan-Cammell Carriage and Wagon Co., Ltd., Birmingham, England, seven first-class coaches, 11 third-class coaches and five third-class luggage and brake vans.

▶ *London Transport Executive*—Has released Birmingham Railway Carriage and Wagon Company from its contract to supply 450 subway cars for LTE's Central and Piccadilly lines. The cars will be manufactured instead by Metropolitan-Cammell Carriage and Wagon Company, which will make delivery beginning early in 1962. Metropolitan-Cammell is also building 589 cars for the Central and Piccadilly lines under an earlier order.

CONTINUED ON PAGE 15

WORLD REPORT

USSR Freight Traffic Climbing; New Line in Operation

Freight traffic on the Russian railways has already reached the level forecast for 1961 under the Seven-Year Plan, according to Boris Beshchev, USSR Minister of Railways.

Carloadings this year, says Beshchev, must be boosted 4.9 per cent over 1960. Carloadings during the harvest season, he predicts, will rise 25,000 above the number loaded during the corresponding period last year.

At the same time, the Russians announce that the northernmost railway in the world has gone into operation. This is a 167-km line above the Arctic Circle, from Murmansk to Pechenga. Built mainly by members of the Young Communist League, construction includes 340 bridges and overpasses. Army sappers, claim the Russians, had to be called in to clear the area of mines, grenades and artillery shells buried by the German army during World War II before construction could began.

Serial production has begun on the N-8 eight-axle, 5,700-hp and the BL-23 six-axle, 4,300-hp DC electric locomotives.

The USSR Ministry of Railways has also reportedly decided to expand its rail system in the Tselinny (Virgin Lands) territory of Kazakhstan. About 216 km of new line is scheduled to be constructed this year, and another 298 km between 1962 and 1965. The total length of operating railway lines in the territory now exceeds 2976 km.

•

UNITED ARAB REPUBLIC: A group of Soviet technicians has arrived in Cairo to assist the UAR in the construction of a 750-km line from the Iraqui border to the Mediterranean port of Latakia. Construction of the railroad is expected to start next year and will take about five years.

TURKEY: Russian and Turkish officials met in Ankara last month to discuss construction of a direct line connecting the two countries. Plans for this date back to a verbal agreement between the two nations in 1921.

ETHIOPIA: The government is reportedly planning construction of a new 300-km line to link Dilla with the Djibouti-Addis Ababa main line. The new branch would join the main line about 100 km south of Addis Ababa.

NORWAY: The 10-year program for modernization of the Norwegian State Railways is proceeding on schedule. Approved by Parliament last year, the plan calls for an investment of Kr. 2,241,000,000 by 1970. Modernization is expected to save Kr. 160 million in annual operating expenses. First results of the program were visible at the end of the 1960 fiscal year when the NSR's total deficit dropped for the first time in five years. Passenger fares have also been boosted 15 to 20 per cent and freight rates, 10 to 15 per cent. Three uneconomic lines—Setesdal, Rise-Grimstad and Aurskog-Holand—are being abandoned. Current plans call for the electrification of the Bergen-Oslo line by the end of 1964, and the reduction of personnel by 8000 (about one-third). More than 3000 railway jobs have been eliminated on the system since 1953.

PHILIPPINES: Construction of a new 330-km rail line from San Jose to Tuguegarao was scheduled to begin 15 April. The new line, which is expected to take seven years to complete, will be an extension of the Manila Railroad's present branch from Tarlac to San Jose. The resulting Manila-Tarlac-San Jose-Tuguegarao line (504 km) will become the railroad's principal route north from Manila, and is expected to promote both industrial and agricultural development of the Cagayan valley. Its construction will require a 4.5-km tunnel through the Caraballo mountains at a height of 650 meters above sea level, and three major bridges, totaling 10 km in length, across the Talavera, Cagayan and Magat rivers.

JAPAN: A delegation of 13 government and railroad officials has been studying monorail systems in Europe to determine the feasibility of using monorail to solve Japan's growing traffic problems. Kanji Shibuya, managing director of the Odakyu Electric Railway Co., who heads the delegation, said the purpose of the visit to Europe was to determine which of the two systems—the French "Safege" or the Swedish Alweg (see page 54) was better suited to Japan's requirements.

ITALY: For use in car-sleeper trains, the State Railways are putting into service a fleet of specially-designed, double-deck, automobile-carrying freight cars. Each car, weighing 14 tons and 14.6 m long, can carry 12 small or six medium or large automobiles. Small autos are loaded in two rows of four each on the lower deck and one row of four on the upper deck; large autos in single rows of three on each deck. The upper deck can be lowered for loading; the fixed bottom deck is lower than the normal Italian standard. The cars will be operated initially between Rome and Milan; Rome and Bolzano, and Rome and Brindisi. In the latter service they will connect with car sleeper trains from Paris and with car ferries to Greece.

. . . Two electric shunting locomotives (Class Gr. E. 321), rebuilt from steam locomotives of the 835 series, have been put into service by the State Railways. They are the first results of "Operation Rebuilt Motive

Power," which is expected to save capital investment and still produce the same low-cost operating results as would the buying of new locomotives. The total program calls for conversion of 50 locomotives and 10 motor units, without cab or trolley, which will be coupled with the Gr. E. 321s. Conversion is done by the FS locomotive works at Verona, with electrical parts by Brown Boveri Italia.

WEST GERMANY: The Federal Railway has repealed "Parkinson's law." That semi-humorous, but frequently verifiable rule, states that "officials want to multiply subordinates" and that "officials make work for each other." Hence, says Parkinson, an average annual increase of 5.75 per cent in administrative employees of large organizations is to be regarded as normal, regardless of the amount of work to be done. The DB, however, has kept its administrative staff increase to 2 per cent per year. To do so, it uses (1) modern methods of work analysis; (2) requires approval of personnel increases by Traffic and Finance departments and by a board which includes representatives of industry, government and unions; and (3) refers such requests to the Personnel department, which works so thoroughtly that its people are nicknamed the "head hunters."

. . . A prototype collapsible container—the "Coitainer"—which may help solve the problem of empty return movements, was demonstrated recently at Mannheim. Opened, it is 4.02 m long, 1.95 m high, and 2.18 m wide, with capacity of 7 tons, or 13 m^3. Collapsed, it occupies only 3.7 m^3. It is all metal, has no loose parts, and weighs 1300 kg. A second type, of smaller size, is now being built.

SOUTH AFRICA: Between 1950 and 1960, according to the latest annual report of the South African Railways, coal traffic climbed 25.5 percent; fruit traffic, 50 per cent; petroleum products, 81 per cent; and manganese, iron and chrome ore by 107 per cent. To handle the increased traffic, the SAR launched an intensive capital development program which has increased its assets from £264,398,821 to £616,654,310. The number of steam locomotives in service rose from 2,540 to 2,742; electric locomotives from 216 to 472; and diesel locomotive from two to 76. The number of freight cars was increased from 76,321 to 107,380; main-line passenger cars from 2,867 to 3,315.

GREAT BRITAIN: Summer-service plans of British Railways include extension of their increasingly popular car-sleeper services; additional train and steamer services on the Holyhead-Ireland route; and more trains between Aberdeen and Inverness.

. . . BR's North Eastern Region has put into operation at Newcastle a new District Control for supervision of rail movements throughout Northumberland and most of Durham. It replaces two former separate installations headquartered at Newcastle and Sunderland. The new control, divided into nine sections each manned by a Section Controller, covers about 775 route-km, from Berwick on the north to Ferryhill and West Hartlepool in the south, and west as far as Carlisle. All signal stations, yards and motive power depots within that area are connected with the central control by special telephone circuits, which permits continuous supervision of train movements.

UNITED STATES: Railways in the US are lagging behind in technological progress because employe work rules are out-of-date, according to W. M. Keller, vice president of research of the Association of American Railroads. Work rules requiring employment of "unneeded personnel . . . discourage the development of automatic devices," said Keller. The railroads are unable to make full economic use of rail research and new operating techniques. This is one reason why European railway projects outnumber those in the US, Mr. Keller said. He noted that European railway officers, in visits to the US, "have been impressed with the quality of US research, but few have been impressed with its magnitude."

AUSTRALIA: Most startling development on the Australian gauge standardization front during the past month has been the taking out of a High Court writ by the South Australian government challenging the Commonwealth government on the priority of the Port Pirie—Broken Hill project in favor of the Kalgoorlie—Perth task (see IRJ, Jan., 1961; this issue, p. 31). The S.A. government claims an agreement signed in 1949 between the S.A. and Commonwealth governments gives its state priority over Western Australia for gauge conversion. The writ follows reports that the Commonwealth was contemplating the provision of funds for the standardization of the Kalgoorlie—Perth link ahead of the conversion of the Broken Hill line. The agreement, on which the writ is based, provided for the Commonwealth to pay 70 per cent of the cost of converting all the South Australian Railways' 5 ft. 3 in. (1.6 m) and 3 ft. 6 in. (1.067 m) gauge tracks with the remaining 30 per cent to be paid by the State. The agreement also provides for the Commonwealth to convert its own 3 ft. 6 in. (1.067 m) lines between Port Augusta and Alice Springs and Darwin to Birdum to standard gauge, and to construct a link between the railheads at Alice Springs and Birdum.

. . . The Victorian Railways have established a new freight record. For the first seven months of the current fiscal year, carloadings totaled 531,283, an increase of 44,599 over the same period last year. Higher traffic is largely the result of a record wheat harvest.

WORLD POLL

How Railways Use Radio — Part II

Use of radio communication in the railway industry is growing. It is, and will be increasingly, employed in control of shunting operations and in maintenance, perhaps the two most prominent uses to which railway radio is now being put. Four railways replying to IRJ's "World Poll" survey rely on radio almost exclusively for communication, and others plan to switch to it. Radio also will be installed more and more extensively for train-to-wayside communication and for end-to-end communication on long trains. And radio, in its various forms, will, to an expanding extent, replace wire and cable circuits as a basic communications medium.

L'utilisation de la communication par radio s'amplifie dans l'industrie ferroviaire. On l'emploit de plus en plus pour les manoeuvres et l'entretien, les travaux les plus importants de l'utilisation de la radio aux chemins de fer. En réponse à "l'Enquête Mondiale" de l'IRJ quatre sociétés de chemin de fer disent qu'elles se servent presqu'exclusivement de la radio pour les communications et d'autres l'adapteront. On se servira de plus en plus de la radio pour les communications trains-stations et d'un bout d'un long train à l'autre. La radio, dans ses formes différentes, remplacera dans un avenir prochain les systèmes de fils et de cables comme moyen de communication.

•

Funkspruch wird im Eisenbahnbetrieb immer häufiger angetroffen. Er ist und wird weiter eingeführt; seine Verwendung bei der Kontrolle des Rangierbetriebes und bei der Wartung ist vielleicht am auffallendsten. Vier Eisenbahnverwaltungen haben der IRJ's "World Poll" Übersicht mitgeteilt, dass sie sich für Meldungen fast ausschliesslich auf Funkspruch verlassen; andere haben die Absicht, sich darauf umzustellen. Stets mehr und weitgehend werden für Zug-Strecke- sowie für End-zu-End-Meldungen in langen Zügen, Radioanlagen in Betrieb genommen. Radio in verschiedenen Formen wird in immer grösserem Umfang als normales Nachrichtenelement Draht- und Kabelleitungen ersetzen.

El empleo de la comunicación radiofónica en la industria ferroviaria viene aumentándose. Será aplicada más y más en las operaciones de maniobra y en la conservación, siendo éstas actualmente las aplicaciones más conspicuas. Cuatro ferrocarriles que han contestado a la encuesta mundial de la IRJ, cuentan casi exclusivamente con radio para sus comunicaciones y otros más tienen el próposito de adoptarla. Se instalará la radio también en cada vez mayor proporción para la comunicación con los trenes y en los trenes mismos. La radio en sus diversas formas reemplazará más y más los circuitos de alambres y cables como medios de comunicación básicos.

●

• **FC General Bartolome Mitre (Argentina):** Does not employ radio now, but has made studies of its possibilities.

• **FC General Belgrano (Argentina):** Has four central radio installations, plus two in motive power, for use in case of difficulty with regular telegraphic or train control communications. Is considering the possibility of installing microwave equipment.

• **FC General San Martin (Argentina):** Does not use radio at this time, but has drawn up plans for fixed, portable and train installations.

• **Japanese National Railways:** Use radio for railway telegraph and telephone trunk lines, including toll dialing circuits and circuits for car service, dispatching, integrated data processing, etc., on SHF 6700 and 7500 mc band, 24-channel pulse modulation and SS-FM system with from 60 to 240 channels. For train-to-wayside telephone, both public telephone service from certain trains and for operational purposes, JNR uses UHF (330 to 450 mc); the same for trunk-line communication of up to six channels. For emergency use in case of accident or failure of wire circuits due to weather damage there is VHF single-channel FM (60 or 150 mc) or MHF (1000–4000 kc AM or single-sideband) as a permanent standby network in areas subject to frequent wire-system outages. The same system is used for field work, such as maintenance, police communication, etc. (VHF FM), and for ferry-boat communication (MHF). JNR has 466 fixed and base stations, 8 sets in motive power, 14 sets in rolling stock, 20 in road vehicles, and 280 portable sets. Train-to-wayside radio-telephone is used for emergency dispatching on the 550-km Tokaido line, regularly on the 80-km Sendai-Fukushima section of the Tohoku line and the 88-km Osaka-Himeji section. One shunter at Muroran in Hokkaido is radio-equipped, and test operations are being carried out at other yards. The five-year modernization program beginning in 1961 contemplates extending the SHF trunkline network over 1700 km in 32 links; addition of 520 installations for emergency communications; and yard radio or wireless-microphone equipment at 140 locations throughout the system.

• **Kei-Han-Shin Kyuko Railway:** Uses press-to-talk FM sets for emergency communication. Has three central installations, four in motive power, one in rolling stock, and 13 portable sets. Plans extension of train radio and installation of a multi-frequency microwave telephone trunk.

• **Korean National Railroad (South Korea):** Uses short wave simplex fixed equipment for urgent or emergency communication. Nine central installations are in use: Seoul (500 watts), Taejon (150 w), Pusan (1000 w), Sunchon (400 w), Andong (400 w), Samchok (400 w), Iri (75 w), Kwangju (400 w) and Namwon (150 w). Installation of mobile radio for other purposes is in project, using VHF equipment; microwave communication is planned between Seoul and Inchon (39 km).

• **Kowloon-Canton Railway (British Section, Hong Kong):** Does not presently use radio, but installation of VHF radio telephone equipment for emergency or accident use is under consideration.

• **Netherlands Railways:** FM radio on 154–172 mc band is used for humping and yard operations at 25 locations, including eight yards in the Rotterdam area (see IRJ, January, p. 22), and for maintenance and construction crews, using portable sets hired from the post office department as needed. Radio-equipped shunters number 120, and there are a few installations in maintenance cars and road vehicles. Plans for extension are under way, especially increased use of portable sets. Consideration is being given to the possibilities and advantages of system-wide train-to-wayside radio for operation of freight trains, and eventually of all trains. "Nine definite applications on a larger scale wait for all-transistorized lightweight equipment."

• **New Zealand Government Railways:** "Trials have been made with radio communication between the engines and vans of trains and these trials are continuing. No installations are planned for the near future."

• **Nigerian Railway Corporation:** Uses radio for general communication, with five medium-power and three low-power fixed installations. Three road vehicles used in construction of the Bornu extension are radio equipped, and five low-power transportable sets are in use in the same work. One yard, at Kano, is radio equipped but the installation is presently not in use. Has no plans for extension of radio.

• **Norwegian State Railways:** Radio is used "to a rather small extent." One special train has radio communication between driver and conductor, and radio has been used experimentally between locomotive and rotary snowplow. It is also used in catenary maintenance. There are four central installations, one in motive power, one in a railway car, and three in road vehicles, but no portable sets. No immediate plans for extension of radio use.

• **Nyasaland Railways:** Use radio at present only in connection with marine services on Lake Nyasa. "We are considering the possible use of VHF static and mobile equipment over a 100-mile (161-km) stretch of our railway system, this only as a temporary alternative in the event of our land lines being rendered inoperable . . . We have not considered using radio for any other purpose or section of our railway system."

• **Orinoco Mining Company (Venezuela; IRJ, April):** Uses low-band VHF (40–50 mc) FM simplex system for dispatching and centralized traffic control over its entire line from Cerro Bolivar to Puerto Ordaz. There are eight central installations, 26 in motive power, seven in rolling stock, 12 in road vehicles, and 17 in service equipment. No expansion is planned: "We are considering changing equipment to high-band VHF to avoid skip interference in the 40–50 mc band."

• **Pacific Great Eastern (Canada):** Uses VHF radio and microwave for all communications on its 1270-km line. Installations include 20 fixed, eight in diesel railcars, 42 in locomotives, 35 in cabooses and baggage cars, 25 in road vehicles, 110 in track motor cars and work equipment, and 25 portable; all yards are equipped. Expansion of the system is planned to accommodate circuits for automatic train control and data-processing equipment.

• **Pakistan Western Railway (formerly North Western Railway):** Uses point-to-point radio-telegraph (22 central stations) and teleprinter (three installations) circuits for routine correspondence, and radio-telephone (10 stations) for communication between train-control centers. Presently only one locomotive is radio equipped, but one yard is to be equipped for radio control during the 1961–62 fiscal year, and radio teleprinter installations will be increased to five in the same period.

• **Quebec North Shore & Labrador:** Uses radio equipment for end-to-end train communication and from wayside to terminals. Five central installations are in use, 75 sets in motive power, 15 in cabooses, one in a road vehicle, and 75 portable, all furnished by Motorola. CTC rather than radio dispatching is used for train operation, but two classification yards are radio-equipped. Expansion of the system is planned to provide wayside-to-train communication over the entire 574-km route.

• **Royal Railways of Cambodia:** Has 50-watt radio installations at three principal points to supplement telegraphic communications between important stations. No installations in rolling stock or highway vehicles; no portable sets, and no present plans for extension.

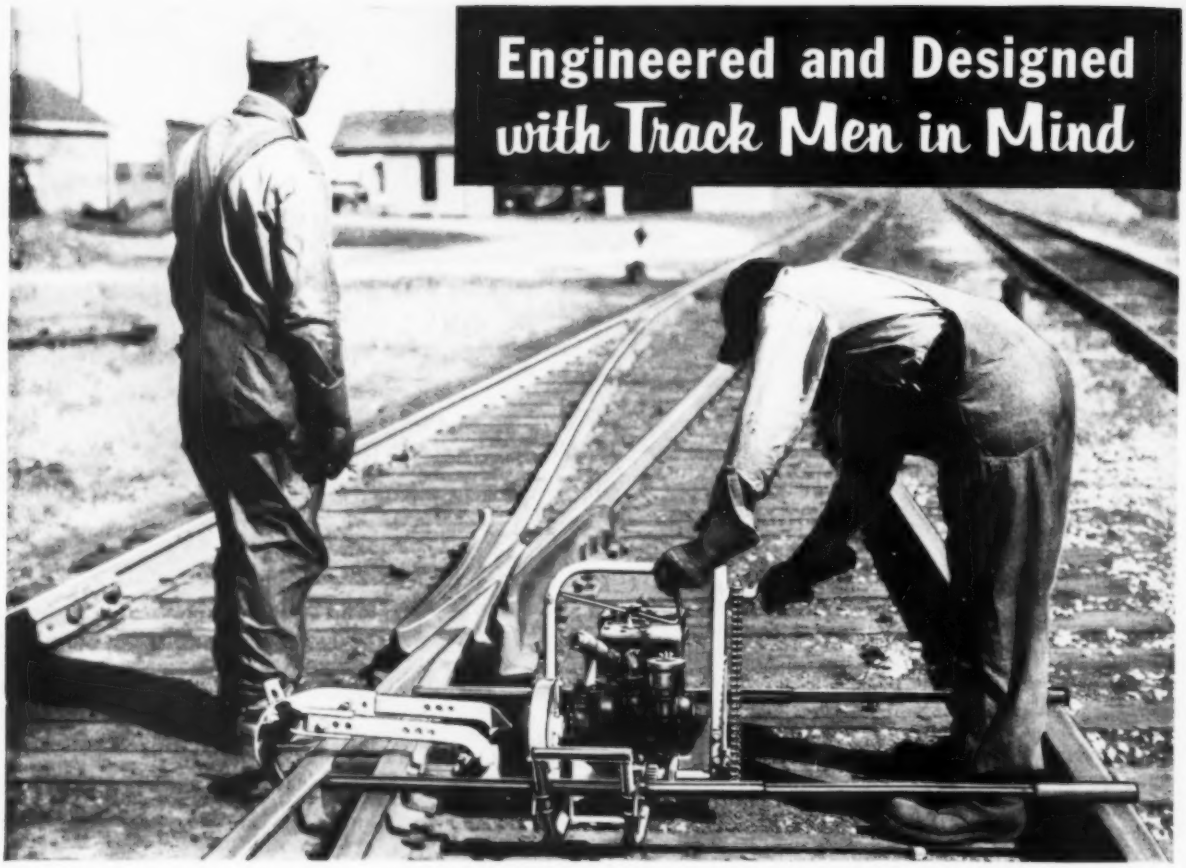
• **Saudi Government Railroad:** Uses radio carrier circuits to all stations for telephone and dispatching, telephone trunk lines, etc., and radio dispatching to all locomotives over the 585-km main line. VHF broadband radio is used with 24-channel carrier circuits, simplex transmission to locomotives and trains. One classification yard is radio equipped. The line has 14 fixed installations, 26 in locomotives, four in rolling stock, eight in road vehicles and four portables. "Future extension of radio facilities is contingent on extension of the railroad from Riyadh to Jidda, a distance of approximately 1500 km."

• **Swedish State Railways:** Use radio for shunting and for track-maintenance gangs. Duplex transmission is used to mobile units, simplex to portable sets. Twenty central stations are in service; 71 locomotives in eight yards have radio equipment. Two sets are installed in road vehicles. Portable equipment includes 128 transceivers and 35 small transmitters. Use of radio for both yard and maintenance communications is to be extended.

• **Swiss Federal Railways:** Radio is used for communication "wherever possible." Specific applications include maintenance of electric transmission feeder lines; classification yard service; steamer operations on Lake Constance; checking of waybills in yards, as an aid to loading of bulk commodities such as sand, gravel and clay, and in hump operation. Portable equipment is used for the most part, in connection with 20-watt fixed stations. Frequencies in general use are in the 400–420, 154–166 and 68–79 mc bands. Five classification yards are radio equipped. There are five central installations, 12 on locomotives, one on a road vehicle and about 50 portable sets in use. "We intend to

CONTINUED ON PAGE 47

Engineered and Designed with Track Men in Mind



WESTERN FORMERLY BUDA Power Track Drill

Here is a vital piece of equipment in keeping track modernization, expansion and maintenance programs in high gear—the Model P power track drill that has ALL the features essential to economical operation.

EASILY SET UP...and ACCURATE. Can be located from top of rail (with optional telescopic support and locater rods) or positioned on ties and ballast (with long overclutch and adjustable rail guide). No change in set up necessary while working on same size rail.

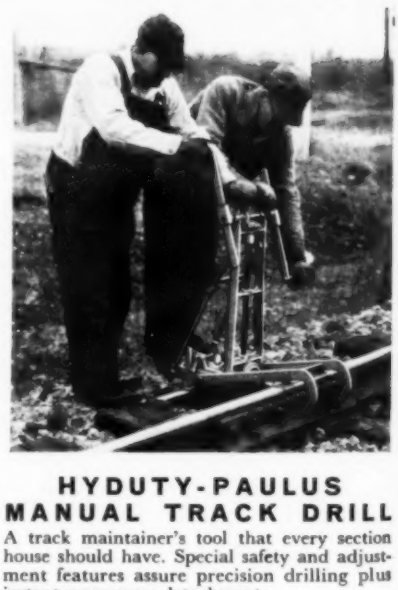
COMPACT and PORTABLE. Weighs only 130 pounds. Can be started, operated and slid along the rail *by one man.* Easily carried overland by two men.

DEPENDABLE. Gives all-weather, long-life service. Powered by easy-starting 3 h.p., 4-cycle Briggs & Stratton air-cooled gas engine. Equipped with Timken roller thrust bearing. Versatile spindle sleeve handles all flat drills from 7/16" to 1 9/16".

SAFE. Can be released and removed from track within 10 seconds . . . no stopping and backing off.

CONTROLLED FEED. Avoids broken and prematurely dulled drills. Sensitive crank-chain mechanism allows operator to vary the thrust accurately according to the hardness of the rail and sharpness of the drill.

FAST. Drills 1 1/8" hole in 90 lb. rail in 30 seconds . . . in 155 lb. rail in less than 90 seconds.



HYDUTY-PAULUS MANUAL TRACK DRILL

A track maintainer's tool that every section house should have. Special safety and adjustment features assure precision drilling plus instant emergency detachment.

5801A

Write for Detailed Information

WRRS

WESTERN RAILROAD SUPPLY COMPANY

Division of Western Industries, Inc.

2742 West 36th Place, Chicago 32, Illinois

IN CANADA: Melville Machinery Co., Ltd., 515 Bisson Street, Montreal 3, Quebec

(Advertisement)

RÉSUMÉ

Conçu et Fabriqué pour l'Equipe de la Voie.

Voici un matériel vital pour tout programme de modernisation, d'expansion et d'entretien de la voie—la perceuse de voies automatique Modèle P, ayant TOUTES les qualités essentielles pour garantir un usage économique.
FACILE A PLACER . . . et **EXACTE.** Peut être installée, soit sur le niveau supérieur du rail (au choix avec support télescopique et tiges de fixation), sur les traverses ou sur le ballast, (avec long embrayage et guide-rail ajustable). Ne nécessite aucun changement d'ajustage sur des rails de même dimension.
COMPACTE et **PORTABLE.** Cette perceuse ne pèse que 60 kilos. Un homme seul peut la faire démarrer, fonctionner et glisser sur le rail. Deux hommes peuvent la transporter facilement.
DE TOUTE CONFIANCE. Elle assure un service de longue durée et en tous les temps et est entraînée par un moteur à essence à refroidissement par air de Briggs-Stratton, de 4 cycles, 3 CV, facile à démarrer. Equipée d'un palier de butée à billes Timken. Un fourreau de broche universel manipule tous les forets plats de $^{7}/_{16}$" à $1^{9}/_{16}$".
S'enlève de la voie en 10 secondes . . . ni arrêt, ni manoeuvre de détalonnage.
APPLICATION CONTROLEE. Empêche que les forets ne se cassent ou s'émoussent prématurément. Un mécanisme de chainemanivelle sensible permet à l'opérateur de varier la poussée avec exactitude, selon la dureté du rail et l'acuité du foret.
RAPIDITE. Elle fore des trous de $1^{1}/_{16}$" dans un rail de 40 kilos en 30 secondes . . . et en moins de 90 secondes dans un rail de 70 kilos.
HYDUTY-PAULUS PERCEUSE DE RAIL A MAIN.
Un outil d'entretien de la voie que tout dépôt de section devrait avoir. Grâce à son ajustage spécial et à la sécurité qu'il offre, il assure un forage de précision et un détalonnage instantané.
Demandez-nous des détails. Ecrivez à: WESTERN Railroad Supply Company etc.

RESUMEE

Besonders für die Bahnmannschaft entworfen und erbaut.

Hier ist ein lebenswichtiges Material, ein wertvoller Beitrag zu den Modernisierungs-, Ausdehnungs- und Unterhaltungsprogrammen—die automatische "Model P" Schienenbohrmaschine hat ALLE zu einer sparsamen Bedienung erforderlichen Eigenschaften.
GENAU UND LEICHT AUFZUSETZEN.
Kann entweder auf die Schienenoberkante (nach Wahl, mit einer teleskopischen Stütze und Befestigungsstäben) oder auf die Schwellen bezw. die Bettung (mit langem Getriebe und verstellbarem Schienenführer) gesetzt werden. Wenn auf dem gleichen Schienenmass gearbeitet wird, ist keine Änderung in der Einstellung notwendig.
KOMPAKT UND TRAGBAR. Wiegt nur 60 Kilos. Kann von einem Mann angelaufen, bedient und über die Schiene geschoben werden. Zwei Männer genügen zum Transport über Land.
ZUVERLÄSSIG. Leistet einen lebenslänglichen Dienst in allen Wetterverhältnissen. Wird durch einen leicht anlaufenden 3-PS, 4-Zyklus Briggs & Stratton luftgekühlten Benzinmotor, ausgerüstet mit einem Timken Kugeldrucklager, angetrieben. Ein Universal-Spindelfutter verwendet alle flachen Bohrer von $^{7}/_{16}$" bis zu $1^{9}/_{16}$".
SICHERHEIT. Kann in 10 Sekunden vom Gleis freigemacht und entfernt werden . . . Kein Halt, keine Hinterdrehung.
KONTROLLIERTE ARBEIT. Vermeidet gebrochene und vorzeitig stumpfe Bohrer. Ein empfindlicher Kurbelkettenmechanismus erlaubt dem Arbeiter den Druck, je nach der Härte der Schiene und der Schärfe des Bohrers, genau abzuwechseln.
GESCHWINDIGKEIT. Bohrt $1^{1}/_{16}$" Löcher in Schienen von 40 Kilos in 30 Sekunden . . . in Schienen von 70 Kilos in weniger als 90 Sekunden.
HYDUTY-PAULUS HANDGLEISBOHRER.
Ein Werkzeug für die Unterhaltung der Gleise das jeder Streckenposten haben sollte. Besondere Sicherheit und Einstellung gewährleisten eine Präzisionsbohrung und sofortige Hinterdrehung.
Wenden Sie sich um weitere Auskunft an: WESTERN Railroad Supply Company etc.

RESUMEN

Calculado y diseñado especialmente para los encargados de vías

He aquí un equipo esencial para cumplir con eficiencia los programas de modernización, ampliación y mantenimiento de las vías: el taladro mecánico de vías Modelo P que incluye TODAS las características necesarias para obtener una operación económica y eficaz.
PRECISO . . . Y FACIL DE PREPARAR. Puede colocarse por la parte superior del riel (con varillas localizadoras y un soporte telescópico opcional) o en la traviesa y el balasto (con un sobre-embrague largo y guía ajustable en el riel). Mientras se trabaje en rieles del mismo tamaño no hay que hacer cambios de ninguna clase.
COMPACTO Y PORTATIL. Pesa solamente 130 libras. Un solo operario puede echarlo a funcionar, operarlo y deslizarlo a lo largo del riel. Fácil de transportar con dos hombres.
SEGURO. Presta servicio en cualquier clase de tiempo, sin fallas ni contratiempos, accionado por un motor de gasolina Briggs & Stratton, de 4 ciclos y 3 HP, enfriado por aire y fácil de arrancar. Equipado con cojinetes de rodillos Timken. El mandril de manguito trabaja con cualquier barrena plana de $^{7}/_{16}$" a $1^{9}/_{16}$".
CONVENIENTE. Puede soltarse y sacarse de la vía en 10 segundos, sin tener que parar y retroceder.
AVANCE CONTROLADO. Evita que se rompan o mellen prematuramente las barrenas. Tiene un mecanismo sensitivo de manivela y cadena que permite variar el empuje con precisión, de acuerdo con la dureza del riel y la agudeza de la barrena.
RAPIDO. Perfora un agujero de $1^{1}/_{16}$" en un riel de 90 libras en 30 segundos . . . en riel de 155 libras en menos de 90 segundos.
TALADRO MANUAL HYDUTY-PAULUS PARA VIAS.
Un equipo de mantenimiento de vías que no debe faltar en ningún taller de ferrocarril. Tiene ajustes y dispositivos de seguridad especiales que garantizan un trabajo preciso de taladrado así como una desconexión instantánea en casos de emergencia.

WESTERN Railroad Supply Company

World Market CONTINUED

▶ *Moçambique Railways*—Is inviting bids, until 12 June, for 11,490 rails, 18 m long and weighing 40 kg/m; 11,590 pairs of fishplates; 69,550 lock washers with bolts; 69,550 spring bolts; 640,000 screws; 237,000 rail brakes; 22 switches; one switch operator; elastic switch shafts, and 50 complete manganese steel protecting switch blocks. Bids, in Portuguese, should be addressed to the Storekeeper, Beira, Moçambique, from whom further details are available. Total estimated cost is $1,551,000.

▶ *National Railways of Mexico*—Has ordered 23 1800-hp diesel electric road-switchers, for delivery in May, from Alco Products, at a cost of $5,440,621.

▶ *Pakistan*—Has ordered 35 freight brake vans from Metropolitan-Cammell Carriage and Wagon Company, Ltd. The same manufacturer is also building 1000 meter-gauge covered freight cars of 17.6 tons capacity for Pakistan's North Western and Eastern Bengal Railways.

▶ *Queensland Railways (Australia)*—A group of Australian, New Zealand and American companies, headed by the local firm of M. R. Hornibrook Pty. Ltd., have begun track-lying on the Richmond-Duchess section of the £30-million Mt. Isa line rehabilitation project. Eventual output of one mile (1.61 km) per day is scheduled.

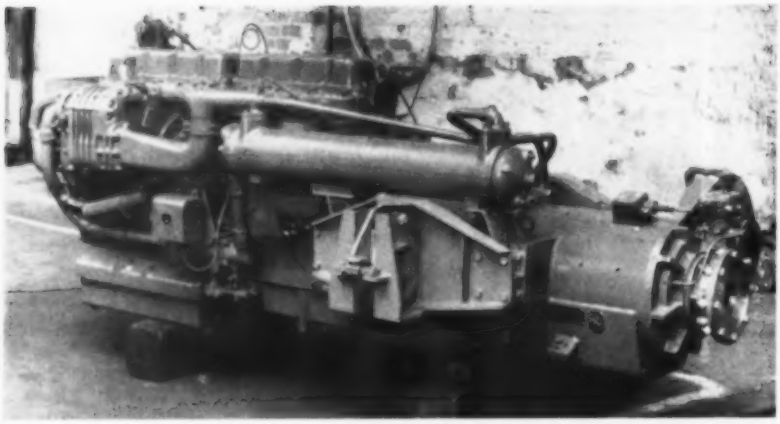
A Japanese steel-making firm has indicated its preparedness to invest capital in construction of a high-speed electrified railway in Queensland. This stems from the same firm's recent placing of large contracts for coal from Queensland's Kianga field. Rail facilities between the mines and the nearest seaport at Gladstone (200 mis or 332 km distant) have an annual capacity of only about 500,000 tons. Thus, it has been proposed that a direct 110-mi (177-km) electrified line with an annual capacity of more than three million tons be built at an estimated cost of £8,000,000.

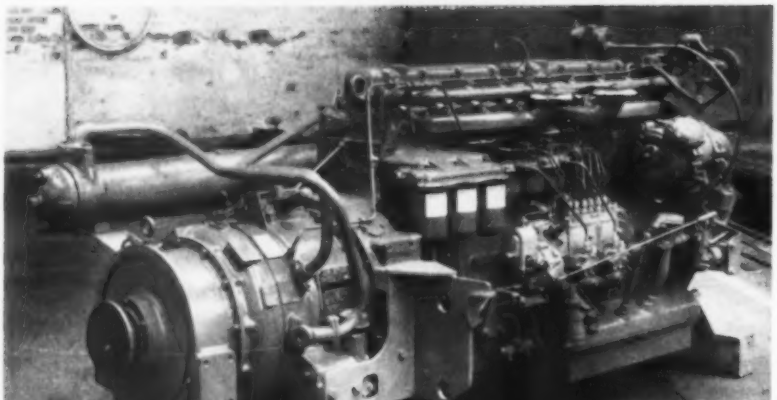
▶ *Sudan Railways*—Is to receive from Metropolitan-Cammell Carriage and Wagon Company, Ltd., 23 passenger-car and 35 freight-car underframes with bogies. These orders follow a contract, now in production, for 35 freight-car underframes and bogies.

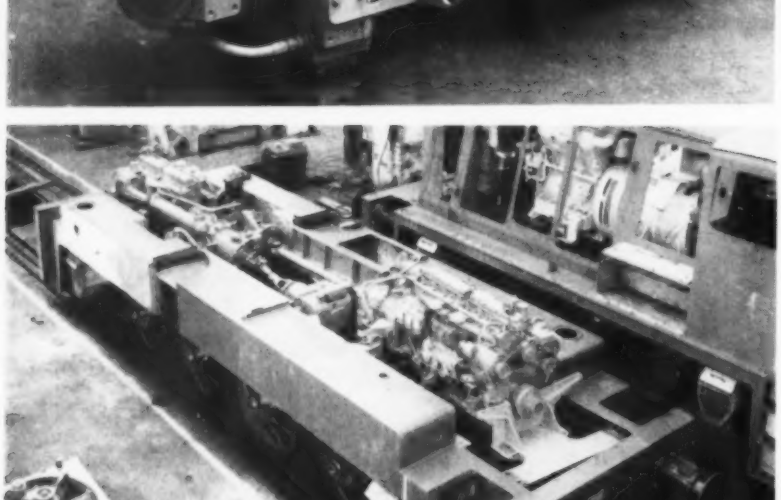
▶ *Victorian Government Railways (Australia)*—Have ordered from Clyde Engineering Company Pty. Ltd., of Sydney, New South Wales, 10 Bo-Bo 875-hp Model G8 Clyde-GM road-switchers, and three 1800-hp Co-Co Clyde-GM cab-type main-line diesel-electric locomotives. The latter are in addition to five now being delivered. VGR is currently completing a three-mile, single-track, electrified suburban extension from Upper Fern Tree Gulley to Belgrave.

The 'Taurus'

Multi-Purpos Lo







Top—Power unit No. 1. Middle—Power unit No. 2. Bottom—Both units, with final drive gearbox between, mounted on locomotive frame.

Ci-dessus—Elément moteur No. 1. Milieu—Elément moteur No. 2. Ci-dessous—Les deux éléments, transmission au milieu, montés sur chassis locomotive.

Oben—Antrieb Nr. 1. Mitte—Antrieb Nr. 2. Unten—Beide Einheiten, mit dem hinteren Getriebekasten in der Mitte, auf dem Lok-Rahmen.

Arriba—Unidad No. 1. Medio—Unidad No. 2. Abajo—Las dos unidades con la caja de velocidades entre ellas, montadas en el bastidor de una locomotora.

A new twin-engined diesel-hydraulic locomotive, now undergoing extensive trials on British Railways, can:

• Handle heavy shunting duties, including yard humping, with only one engine running; or

• Haul from 300 to 500 tons at speeds of up to 36 mph (57.9 kmh) in road freight service, with both engines working.

The 0-8-0, 600-hp "Taurus" locomotive was built by Yorkshire Engine Company, Ltd., Sheffield, England (subsidiary of United Steel Companies, Ltd.). It utilizes a novel differential transmission developed by the Railway Traction Department of Rolls-Royce, Ltd., Shrewsbury, England.

Yorkshire Engine Company's "Taurus" locomotive is designed to fill the present gap between shunting locomotives of 400 hp or less and 800/1000-hp diesel-electric or diesel-hydraulic Bo-Bo road freight locomotives. With a rigid frame and coupled wheels, it has a much higher continuous tractive effort than the latter, and can at the same time brake a train of equivalent weight with only 58 tons adhesion.

Heart of the new locomotive is the novel "Type S" transmission developed by Rolls-Royce for twin-engined locomotives. This transmission, which utilizes two automotive type engines and two torque converters, is expected to set improved standards of performance and economy for locomotives used for shunting or transfer duties or for some types of road freight service.

With the Type S transmission, a locomotive may be propelled by No. 1 engine alone, or by both engines, but initial tractive effort is always given by No. 1 only, and that engine can produce the locomotive's full tractive effort for heavy, low-speed work. When higher speeds are needed, the drive from the second engine can be engaged without break in torque, and without gear changing by the driver. When both

us'

oos Locomotive

engines are running, they engage opposite sides of the differential.

By comparison with a twin-engine installation without a differential, the Rolls-Royce arrangement gives either:

- Higher initial tractive effort with the same top speed; or
- Higher top speed with the same initial tractive effort.

For that reason it is considered particularly suitable for locomotives which are principally engaged in heavy shunting, but which may also make occasional transfer or main-line trips.

A service installation comprises two rationalized diesel engines and three-stage hydrokinetic torque converters; a compounding differential gearbox, and an axle-mounted final drive gearbox.

When the locomotive starts to move, maximum tractive effort is provided by No. 1 engine and the torque converter operating alone. In this condition, the differential gives a torque multiplication of 2 to 1, so the over-all torque multiplication is in the neighborhood of 10 to 1. The drive from the second engine may be introduced, if needed, when a train has gathered speed. In a typical locomotive this speed could be anywhere from 4 to 14 mph (6 to 22 kmh). There is no break in torque when the second engine is added or withdrawn, and no gear changing to be done by the driver. When both engines are running together, they are always in balance.

Reversing mechanism is built into the final drive gearbox. A cooling system capable of operating in ambient temperatures up to 49 deg C may be mounted integrally with each unit. Westinghouse vacuum-controlled straight air brake equipment is fitted, with arrangements whereby train-brake application will apply to locomotive air brake proportionally. A hand parking brake is also included, as is provision for dead-man control.

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Locomotive à Usage Multiple Grâce à une Nouvelle Transmission

Une nouvelle locomotive diesel-hydraulique à deux moteurs en essai à la British Railways fait le triage lourd avec un moteur. A deux moteurs elle peut tirer de 300 à 500 tonnes de marchandises à des vitesses jusqu'à 57.9 kmh. La locomotive 0-8-0 "Taurus" 600 CV construite par la Yorkshire Engine Company Ltd. à Sheffield, est pourvue d'une nouvelle transmission à différentiel "Type S" de Rolls-Royce. Elle a été conçue pour combler la lacune actuelle entre les locomotives de triage de 400 CV et moins et celles pour les marchandises de 800/1000 CV.

Neuer Antrieb Verwandelt 'Taurus' in eine Mehrzwecklok

Eine neue, zweimotorige dieselhydraulische Lokomotive, von der British Railways ausprobiert, leistet mit einem Motor schwere Rangierarbeit. Mit beiden Motoren zieht sie im Güterverkehr 300 bis 500 t mit Geschwindigkeiten bis zu 57.9 km/h. Die 0-8-0, 600 PS Lok, "Taurus" wurde bei der Yorkshire Engine Company, Ltd., Sheffield, England, mit einem neuartigen, von Rolls-Royce entwickelten, "Type S" Differentialgetriebe gebaut. Sie wird die heutige Lücke zwischen Rangierloks von 400 PS, oder weniger, und den 800/1000 PS Streckenlokomotiven füllen.

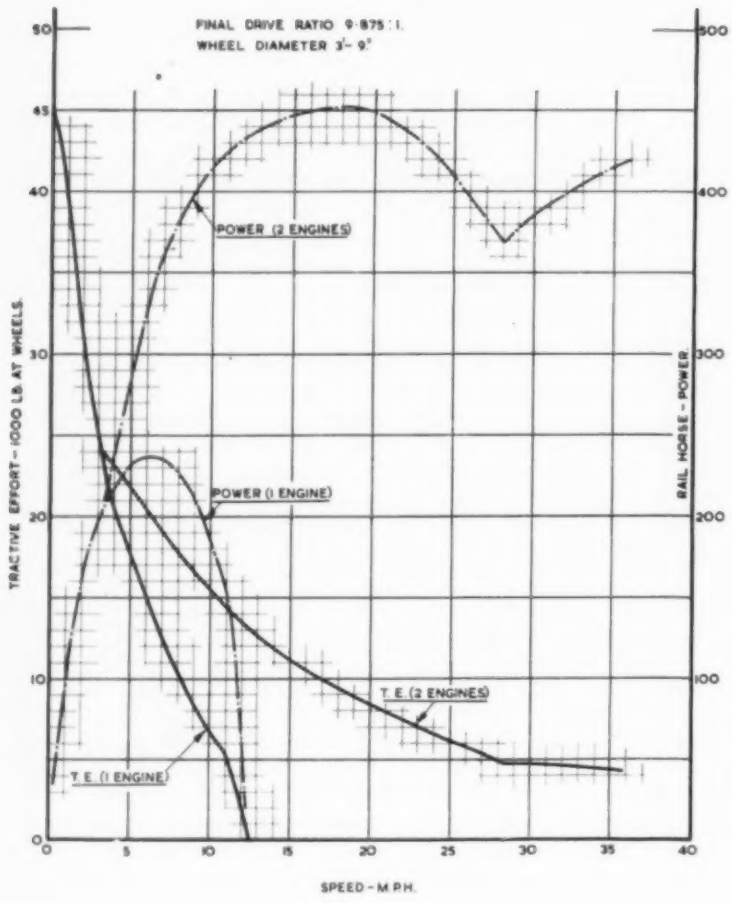
Nueva Transmisión Hace la Locomotora 'Taurus' Muy Adaptable

Una nueva locomotora diesel-hidráulica con motores gemelos, con la que se están haciendo ensayos en los ferrocarriles británicos, puede efectuar operaciones de maniobra pesadas con un solo motor. Con dos motores puede arrastrar cargos de 300 a 500 toneladas a una velocidad de 57,9 km en servicio de transporte. La locomotora "Taurus" 0-8-0, 600 CV, construida por la Yorkshire Engine Company Ltd., Sheffield, Inglaterra, utiliza una nueva transmisión diferencial "Tipo S" diseñado por Rolls Royce a fin de llenar el hueco entre locomotoras de maniobra de 400 CV o menos y las de servicio de 800/1000 CV.

'Taurus' Locomotive — Technical Data

Weight	58 tons
Wheel arrangement	O-D-O
Axle load, each axle	14.5 tons
Wheel diameter	3 ft, 9 in. (114.3 cm)
Oil engines	Two Rolls-Royce, Type C8SFL
Rating, each engine	311 hp at 1800 rpm
Input to converter, each engine	297 hp at 1800 rpm
Torque converter, No. 1 engine	Rolls-Royce Type CF 11,500 Ms. 390 lb/ft
Torque converter, No. 2 engine	Rolls-Royce Type DF 11,500 Ms. 390 lb/ft
Differential gearbox, No. 1 engine	Rolls-Royce Type CGD 710
Final drive gearbox	Rolls-Royce Type CGF 610 with reduction ratio of 9.875:1
Maximum tractive effort	45,000 lb (20,412 kg)
Continuous working range	1–36 mph (1.6–57.9 kmh)
	1–11.5 mph (1.6–18.5 kmh) on one engine
	6–36 mph (9.6–57.9 kmh) on two engines
Dimensions:	
Length over-all	31 ft, 11¼ in. (9.73 m)
Width over-all	8 ft, 5½ in. (2.58 m)
Height over cab	12 ft, 2 in. (3.71 m)
Wheelbase	13 ft, 6 in. (4.11 m)
Fuel capacity	450 Imp. gal (2043 liters)

'Taurus' Locomotive — Performance



'TAURUS' LOCOMOTIVE

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Except for the brake, only three driving controls are needed—an engine selector, a regulator and a reverse lever. The two latter controls operate, respectively, the engine fuel supply and the final drive reversing mechanism.

The following controls are automatic: (1) Engines are governed to prevent stall on the one hand, and overspeeding on the other; (2) no manipulation of the regulator is required when the second engine is added or withdrawn; (3) it is impossible to change from forward to reverse, or vice versa, unless the regulator is fully closed, the torque converter clutches are disengaged, and the locomotive is at rest.

Rolls-Royce claims the following advantages for its Type S transmission:

- At low speeds, full tractive effort comes from one engine only.
- The 2:1 gear ratio introduced through the differential is ideal when the demand is for maximum tractive effort with a steadily-maintained low rail speed.
- The ability to maintain full tractive effort on only one engine nearly halves fuel consumption. The same factor also reduces wear and tear on engines.
- Continuous operation is possible at very low rail speeds.
- The differential automatically insures a balance of torque from both engines.

Additional advantages are claimed also for twin-engined, as compared with single-engined, locomotives. They allow, for example, use of a central driving cab, with resulting better vision. Accessibility for repair and maintenance is better, and engine removal and replacement is easier with two small units than with one big one.

The low weight (7/8 kg/hp) of the twin-engine installation eliminates, Rolls-Royce says, the need to complicate the locomotive to save weight; permits disposing weight evenly over the axles; and allows installation of the equipment in locomotives running on tracks down to meter gauge.

The main frame of the "Taurus" locomotive itself is built up of heavy steel bar side frames bolted together by fabricated stretchers and heavy steel buffer beams, which are brought down to protect the final drive gearbox from damage in event of derailment. Wheels are of the cast steel spoke type, fully balanced.

Grease-lubricated Timken tapered roller bearing axle boxes are provided; boxes and guides are lined with 11/14 per cent manganese steel, requiring no lubrication.

The six-day Elst exhibit of permanent-way devices drew an audience of thousands of railway men of all ranks from many different countries.
Des milliers de cheminots de nombreux pays ont visité l'exposition de dispositifs pour la superstructure à Elst, Pays-Bas.
Die sechstägige Ausstellung von Oberbau-Maschinen in Elst wurde von Tausenden Fachleuten aus vielen Ländern besucht.
Miles de ferroviarios de varios países visitaron la exhibición de maquinaria para la superstructura en Elst.

Elst: Permanent-Way Showcase

Latest developments in cost-cutting machinery for track maintenance—the products of manufacturers from eight countries—were displayed in action to thousands of railway men at this year's International Permanent Way Exhibition, held at Elst, in The Netherlands, late in March.

"In all countries, railways are engaged in keen competition with other means of transport. They are trying to find new ways to reduce operating expenses. No wonder, therefore, that developments in the design and construction of mechanical tools are now beginning to assume larger proportions. Only by international cooperation will results in this field be raised to the highest level."

In those words, J. L. Hoorweg, manager of the Permanent Way Department of the Netherlands Railways, opened, and explained the purposes of, the Elst exhibit.

Organized by the NS in cooperation with the Association of German Railway Engineers (VDEI), the exposition followed the same general lines as the annual VDEI show held in previous years at Frankfurt/Main.

- It was international, both in participation and in attendance, with visitors from as far away as Japan.
- It was democratic, open to railway

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Exposition Internationale: Dispositifs pour Réduire les Frais d'Entretien

L'outillage le plus récent pour réduire les frais d'entretien de la voie—des produits de 34 fabricants de huit pays—en démonstration devant des milliers de cheminots de nombreux pays à l'Exposition Internationale de la Superstructure à Elst, aux Pays-Bas, fin mars. Le matérial exposé comprenait un assortiment complet de tout ce qui est requis pour réparer la voie, depuis des bourreuses de ballast manuelles et des compresseurs portatifs, jusqu'aux trains entiers pour repasser le rail.

Wirtschaftliche Gleiswartungmaschinen auf der Internationalen Ausstellung

Auf der in diesem Jahr, Ende März, in Elst/Niederlande abgehaltenen Internationalen Ausstellung für Oberbau, die von Tausenden Fachleuten aus vielen Ländern besucht wurde, stellten 34 Fabrikanten aus acht Ländern wirtschaftliche Gleiswartungsgeräte aus. Das ausgestellte Material deckte einen weiten Bereich der erforderlichen Gleisausbesserungsgeräte und -werkzeuge, und zwar vom handgehaltenen Schotterstampfer bis zum tragbaren Kompressor für Schienenschleifzüge.

Equipo Económico para la Conservación de la Vía en Exhibición Internacional

En la Exhibición Internacional de Superestructura que se celebró en marzo en Elst, Países Bajos, miles de ferroviarios de muchos países podian examinar los últimos modelos de maquinaria económica para la conservación de la vía. Las exhibiciones mostraban una serie completa de máquinas para la conservación de la vía, bateadoras de mano para el balasto, compresores portátiles y hasta trenes completos para el repasado de rieles.

International Exposition Features Working

Railway Machinery Corp. (US) sent tamper.
Bourreuse de Railway Machine Corp. E.U.
Gleisstopfer der Railway Machinery Corp. (US)
Bateadora de la Railway Machinery Corp.

ELST CONTINUED

personnel of all ranks, from track laborers to top management.

• It was comprehensive. Equipment on display covered the entire range of permanent way needs, from giant ballast cleaners and complete weed-killing and rail-grinding trains down to small portable compressors and track spikes.

• It was informative, because working demonstrations were the order of the day. As one visitor observed, the end of the Elst yard where the exhibit was held was probably, by the end of the week, "the most intensively tamped, levelled and worked-over track in the world."

Track components of the latest design attracted a high degree of attention; rail fastenings, concrete sleepers and welding processes all were well represented. The Swedish Rail Service, of Stockholm, demonstrated the Swedish method of laying complete panels of pre-assembled, concrete-sleepered track (IRJ, April, p. 56). SES, of Holland, showed its zig-zag sleeper system (IRJ, March, p. 38); and displayed interesting applications of high-strength adhesives in insulating rail joints and rails on steel bridges. Elektro-Thermit GmbH, of Essen and Berlin, Germany, gave working demonstrations of a wide range of thermit welding equipment for railways, tramways and mines.

Heavy-duty tamping and levelling machines, as well as a variety of other machinery, were displayed by both Matisa and Plasser and Theurer.

CONTINUED ON PAGE 23

Brimpex showed light-loading devices.
Outils légers Brimpex pour charger.
Brimpex: leichte Lademaschinen.
Aparato para cargar de Brimpex.

Rail driller was a French exhibit.
Perceuse de rail, francais.
Schienenbohrer aus Frankreich.
Taladradora de rieles, francés.

Hymatic compressor, motor, has many uses.
Compresseur Hymatic, plusieurs usages.
Hymatic Kompressor, ein Mehrzweckmotor.
Compresor, motor Hymatic, muy adaptable.

Rail-grinding outfits were displayed by Spema (Matisa, Switzerland, and Speno, US), and Schörling of Hannover, Germany.
Outillage pour rail exposé par Spema (Matisa, Suisse et Speno, E.U.) et Schörling de Hannovre, Allemagne.
Schienenschleifgeräte wurden von Spema (Matisa, Schweiz und Speno, USA) und Schörling, Hannover, ausgestellt.
Equipos de repasado de rieles de Spema (Matisa, Suiza y Speno EEUU) y de Schörling de Hannöver, Alemania.

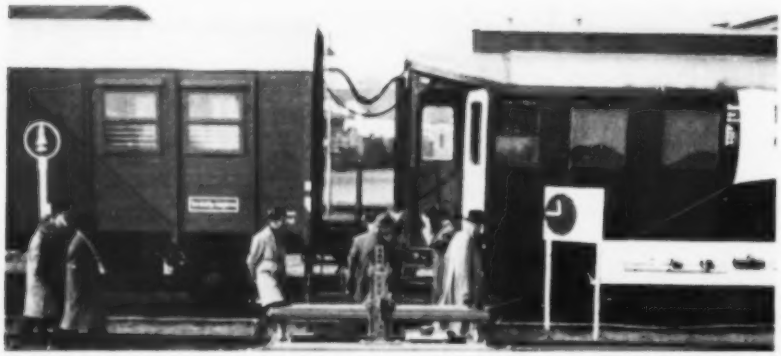
Demonstrations of Wide Range of Track Maintenance Machinery

Windhoff track-liner drops for trains.
Redresseur se baisse au passage de trains.
Windhoff Spurrichter senkt sich vor Zügen.
Aparato de alineación baja para trenes.

Most devices—like Atlas Copco "Cobra" lightweight tie tampers—were demonstrated in action.
Des outils—comme la bourreuse légère Atlas Copco "Cobra"—furent montrés en action.
Viele Geräte—wie der leichte Atlas Copco "Cobra" Gleisstopfer—wurden vorgeführt.
Las máquinas—como las bateadoras Atlas Copco "Cobra" fueron demostradas.

Who Was Who at the Elst Exposition

N.V. Atlas Copco	Rotterdam, Netherlands
Beche Printz, Germany	Represented by Eng. Wirtzing, Frankfurt, Germany
Bosch, Germany	Represented by N.V. Willem van Rijn, Amsterdam, Netherlands
Brimpex, Ltd.	Camberley Ferry, England
Broom & Wade, England	Represented by Van Rietschoten & Houwen, Rotterdam, Netherlands
N.V. Bruynzeel Fineerfabrieken	Zaandam, Netherlands
N.V. Comprimo	Amsterdam, Netherlands
Consolidated Pneumatics	London, England
Elektro-Thermit GmbH	Essen and Berlin, Germany
Firma Jan van Leusen	Deventer, Netherlands
Geismar	Colmar, France
Hymatic Engineering Company	Redditch, England
Schörling and Company	Hannover, Germany
International Railway Journal	The Hague, Netherlands
Kango Electric Hammers	South Wimbledon, London, England
Lamp Manufacturing	Dorking, England
N.V. Landbouwbureau M. Wiersum	Groningen, Netherlands
Mabellini (Société Industrielle des Métaux Manufacturés)	Nyon, Switzerland
Maschinenfabrik Windhoff	Rhein, Germany
Matisa, Switzerland	Represented by Stamex, Witte Huis, Rotterdam, Netherlands
N.V. Meteoor	De Steeg, Netherlands
N.V. Multiper	The Hague, Netherlands
Orenstein-Koppel and Luebecker Maschinenbau A.G.	Dortmund, Germany
Pintsch Bamag A.G.	Butzbach, Germany
Plasser and Theurer	Vienna, Austria
Railway Maintenance Corporation	Pittsburgh, Pennsylvania, USA
Robel	Munich, Germany
Schenck	Germany
Scheuchzer	Lausanne, Switzerland
Industriële Ondernemingen ARMA N.V.	Soesterberg, Netherlands
SES—Maatschappij voor Spoorwegbovenbouw	Alphen aan den Rijn, Netherlands
N.V. Spoorwegbouwbedrijf	Utrecht, Netherlands
Stabeg Apparaten Baugesellschaft	Vienna, Austria
Swedish Rail System	Stockholm, Sweden
Tetzlaff Verlag	Germany
Wacker	Germany

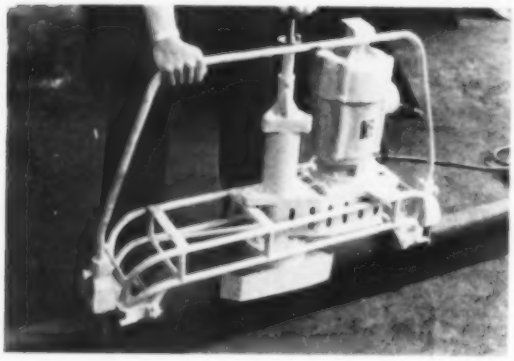


Training films produced by railways and manufacturers were shown in instruction cars.

Des films instructifs de sociétés ferroviaires et de fabricants projetés dans des voitures.

In Instruktionswagen wurden Eisenbahn- und Fabriksfilme vorgeführt.

En vagones especiales se rodaban películas de instrucción de ferrocarriles y fabricantes.

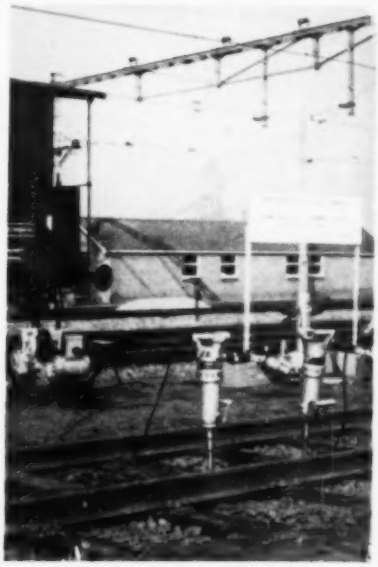


Rail-head adjustment grinding machines were displayed by Robel of Munich, Germany.

Des machines pour l'ajustage des champignons de rail exposées par Robel de Munich, Allemagne.

Robel, München, stellte Schienenkopfschleifmaschinen aus.

Máquinas de repasado para hongos exhibidas por Robel de Munich, Alemania.

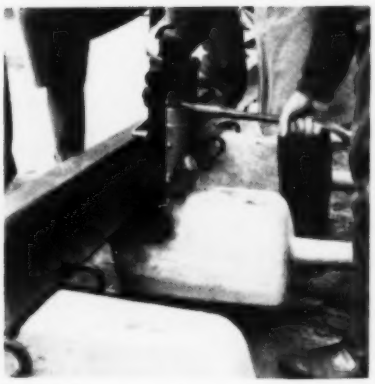


Kango Hammers showed many products, including generators and tampers.

Kango Hammers expose de nombreux produits, e.a. générateurs et bourreuses.

Kango Hammers zeigte viele Erzeugnisse, u.a. Generatoren und Gleisstopfer.

Kango Hammers mostraba muchos productos, incluso generadores y bateadoras.



Swedish Rail Service had a popular exhibit, demonstrating special trolleys for laying completely pre-assembled track panels.

L'exposition suédoise, la pose par lorry spécial de travées entières préfabriquées, a suscité un vif intérêt.

Der schwedische Stand war sehr populär, es wurden spezielle Karren für das Legen vorgevormter Gleisrahmen demonstriert.

Exhibición popular del Swedish Rail Service, carretillas especiales para colocar tramos de vía enteramente prefabricados.

Represented in Displays by Track Supply Manufacturers

ELST CONTINUED

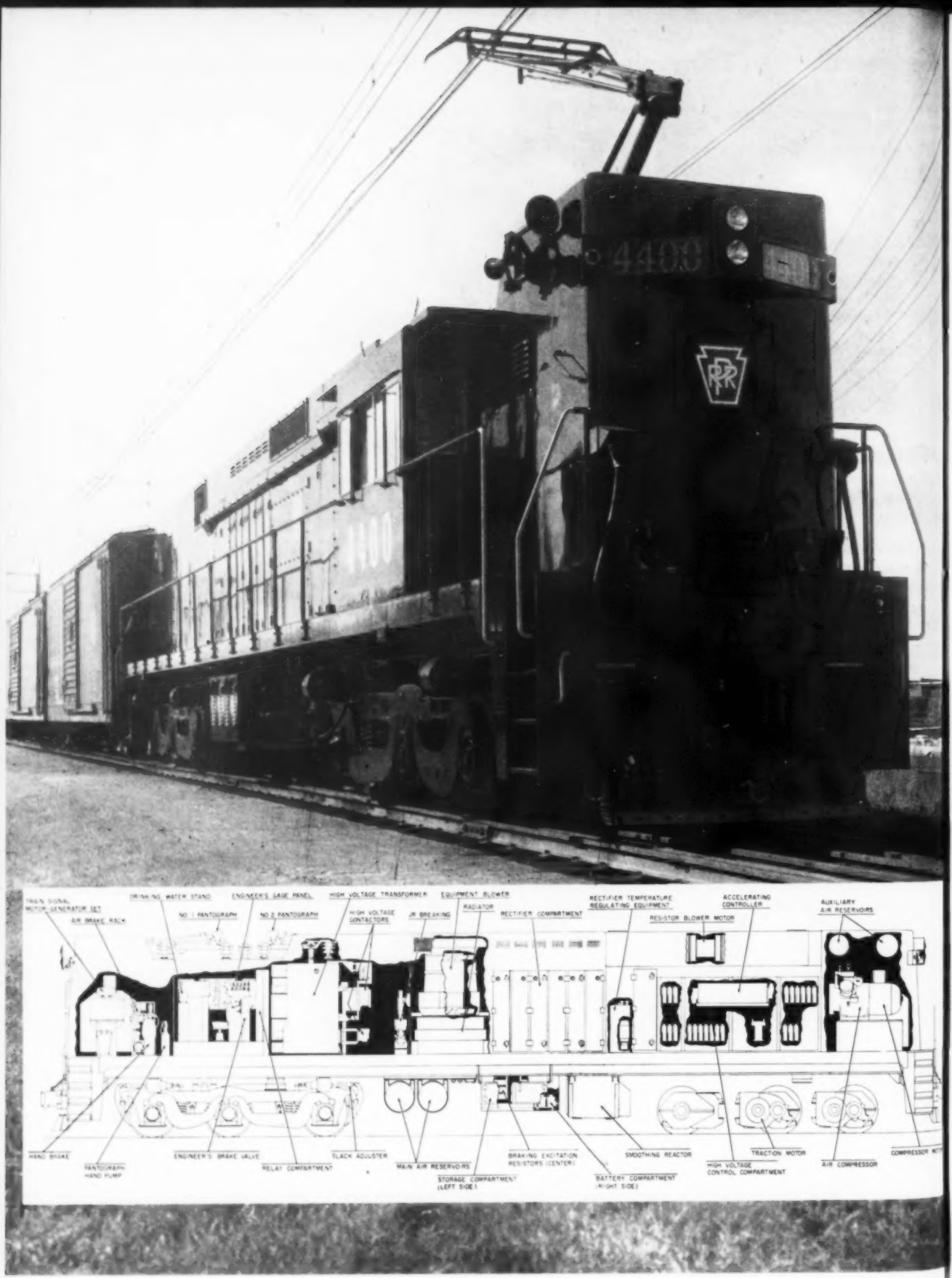
Smaller powered tools for such maintenance jobs as tamping, bolt and spike driving, adzing, and rail drilling and sawing were exhibited by several companies. Still others displayed portable lighting installations and devices for handling various types of track material.

Considerable attention was drawn by two developments shown by Spema Rail Service, a joint venture of Matisa and the US firm of Speno. These were a rail-grinding train of Speno design and a magnetic and ultrasonic rail-testing car.

Exhibits by railways themselves included propane heating equipment for switches and turnouts, and a special tank car for supplying the heaters. Both German and Dutch boarding trains for maintenance of way personnel were also shown, and instruction cars were used to show a steady program of training films.

Elektro-Thermit's rail-welding system, like other devices, was demonstrated in action.
Le système Elektro-Thermit pour souder les rails en plein fonctionnement.
Das Schienenschweiss-System und andere Geräte von Elektro-Thermit wurden vorgeführt.
Sistema para soldadura de rieles Elektro-Thermit demostrado en plena marcha.

Matisa of Switzerland and Plasser and Theurer of Austria brought a wide variety of devices for repair and maintenance of track.
Matisa de Suisse et Plasser et Theurer d'Autriche offrent une grande variété d'outillage de réparation et d'entretien de la voie.
Matisa, Schweiz, Plasser und Theurer, Österreich: grosse Auswahl von Geräten für Gleisausbesserung und Wartung.
Matisa de Suiza y Plasser y Theurer de Austria demostraban una gran variedad de aparatos para la conservación de la vía.


4400
PRR
TRAIN SIGNAL MOTOR GENERATOR SET
AIR BRAKE RACK
DRINKING WATER STAND
NO. 1 PANTOGRAPH
ENGINEER'S GAGE PANEL
NO. 2 PANTOGRAPH
HIGH VOLTAGE TRANSFORMER
HIGH VOLTAGE CONTACTORS
EQUIPMENT BLOWER
JR BREAKING RADIATOR
RECTIFIER COMPARTMENT
RECTIFIER TEMPERATURE REGULATING EQUIPMENT
RESISTOR BLOWER MOTOR
ACCELERATING CONTROLLER
AUXILIARY AIR RESERVOIRS
HAND BRAKE
PANTOGRAPH HAND PUMP
ENGINEER'S BRAKE VALVE
RELAY COMPARTMENT
SLACK ADJUSTER
MAIN AIR RESERVOIRS
STORAGE COMPARTMENT (LEFT SIDE)
BRAKING EXCITATION RESISTORS (CENTER)
BATTERY COMPARTMENT (RIGHT SIDE)
SMOOTHING REACTOR
HIGH VOLTAGE CONTROL COMPARTMENT
TRACTION MOTOR
AIR COMPRESSOR
COMPRESSOR MOTOR

US Progress in Electric Motive-Power

Progress in the employment of electric motive-power on railways in the United States is reflected by the Pennsylvania Railroad's $32,000,000 order for 66 General Electric 195-ton, 4,400-hp Co-Co road freight locomotives. They are to replace 90 2-Co-2, 3,750-hp freight units in service since the early 1930's. The new E-44 units use the ignitron rectifiers that have been prominent in recent AC locomotive design in many parts of the world.

Progrès Américain en Force Motrice Electrique

Le progrès dans l'utilisation de la force motrice électrique aux chemins de fer aux E.U. se réflète dans la commande de $32,000,000 de la Pennsylvania Railroad pour 66 locomotives General Electric Co-Co pour marchandises. Les nouveaux éléments automoteur E-44, de 4400 CV, 195 tonnes, utilisent des redresseurs ignitron, caractéristique des locomotives CA les plus récentes dans le monde et remplaceront 90 2-Co-2, 3750 CV en service depuis 1930.

US Fortschritt in Elektrischer Triebkraft

Die fortschrittliche Verwendung elektrischer Triebkraft bei den Eisenbahnen in den Vereinigten Staaten widerspiegelt sich in dem $32,000,000 Auftrag der Pennsylvania Railroad für 66 General Electric Co-Co Güterzugloks. Diese neuen 4400-PS, 195-tonnigen Einheiten E-44 haben Einanodengleichrichter mit Zündstift, die sich in den kürzlich eingesetzten Wechselstromloks bewährt haben. Sie werden 90 2-Co-2, 3750 PS Einheiten verlegen, die seit 1930 in Betrieb sind.

E.U.: Desarrollo de la Fuerza Motriz Eléctrica

El desarrollo de la aplicación de la fuerza metriz eléctrica en los EE.UU. se refleja en la adquisición de 66 locomotoras de carga Co-Co General Electric ($32,000,000) del Pennsylvania Railroad. Las nuevas unidades E-44 (4400 CV, 195 toneladas) usan rectificadores de ignitrón que se aplican más y más en el diseño de locomotoras c.a. Reemplazarán 90 2-Co-2 máquinas de 3750 CV en servicio desde 1930.

During the past two decades diesel-electric locomotives—rather than electricity from central power stations—have been used to replace steam operation on US railroads. None the less, the efficiency of central-station power on some of the lines already electrified has been recognized. As far as the Pennsylvania Railroad is concerned, President Allen J. Greenough says "An electrified railroad is the most efficient means of transportation over land where there is sufficient volume to warrant the investment, as in our New York-Philadelphia-Washington-Harrisburg lines."

The routes referred to by Mr. Greenough were electrified in the early 1930's. They are served by 130 streamlined 4,620-hp, 2-Co-Co-2 freight-and-passenger electric locomotives and 10 experimental freight electric locomotives, in addition to the 90, 3,750-hp, 2-Co-2 units which are now being replaced.

About ten years ago, the PRR began to study the possibility of using DC traction motors on locomotives operating under its 11,000-volt, 25-cycle, AC catenary system. All of the railway's standard mainline electric locomotives have AC traction motors.

By its experiments the Pennsylvania hoped to reap the benefits of the best features of both currents. A spokesman for the railroad states the situation succinctly: "AC power can be transmitted over wires more readily than DC, but a DC traction motor is notably more efficient than an AC motor."

Initially a Pennsylvania multiple-unit car was equipped with ignitron rectifiers and DC motors. In 1951 two experimental road freight locomotives with rectifiers and DC traction motors were placed in service, followed by six similarly powered MU cars.

The new 4,400-hp ignitron rectifier locomotives are a direct result of PRR's successful experiments. Mr. Greenough has pointed out that, in acquiring the new locomotives, the PRR was "taking a long, confident look into the future . . . These units will serve for many years to increase the capacity of our electrified lines, improve service to shippers, and strengthen our reserve potential in the unhappy event of a national emergency."

The 66 units, now being delivered at the rate of two per month by the General Electric Co., are scheduled to be in service by mid-1963. The Pennsylvania expects a sharp reduction in maintenance costs when the entire contingent of E-44's has replaced the 90 outmoded 2-Co-2 freight units.

The new unit has a road-switcher type body, measuring 21.2 meters over coupler pulling faces, mounted on two six-wheel bogies. Continuous tractive effort is 12,175 kg and maximum speed is 112.63 km/h. The cab is located over the lead truck with the short hood nominally rated as the front of the unit, although the cab is fitted with two complete sets of controls, simplifying operation in either direction. Locomotive controls are arranged for operation of up to four units in multiple. All units are fitted with 26-L air brakes and dynamic braking equipment. During dynamic braking, the motoring resistors serve as braking resistors. They are forced-air cooled with the air volume varied in relation to the braking load.

The equipment hood extends from the cab to the rear end of the locomotive. The Pyranol air-cooled transformer, located next to the cab, occupies the full width and height of this section. Included on the transformer are the tap switches that supply a variable voltage to the rectifiers and traction motors, a Pyranol pump to circulate the transformer coolant, and other switch gear necessary for the circuit operation. The 11,000-volt high-voltage bushing extends from the top of the transformer through the roof, thus confining the 11,000-volt circuit to the roof. Canopies extend over the outside walkways underneath the pantograph area to protect personnel from contact with the high voltage.

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Power at 11,000 volts, 25 cycles, is fed directly to the transformer. The secondary tap switches located on the transformer tank supply a variable voltage to the 12 ignitron rectifier tubes arranged three to a group in a bridge connection. The rectifier power flows through a smoothing reactor to the six GE-752 traction motors, one on each axle. These motors are permanently connected two in series, three pairs in parallel. Speed-tractive effort control is provided by tap changing on the transformer secondary, and by using resistors in series with the motor armatures.

Auxiliaries, such as the motor-generator set, air compressor motor, equipment blower motor, etc., operate from a 196-volt tap on the transformer secondary. All are single-phase induction motors, thus eliminating commutator and brush maintenance.

Adjacent to the transformer switch gear is a high-speed air circuit breaker to limit the current on the arc-back. Protection is also provided for short circuit and ground faults occurring in the transformer and traction-motor circuits. Auxiliaries have individual overload protection.

The twelve main-circuit power-rectifier tubes, with their firing circuit apparatus, are located next to the hood doors at this section, providing easy inspection and maintenance of rectifier tubes and circuits. Four iron-core current balancing reactors are located between the rectifier cubicles, while the main smoothing reactor is underneath the platform below the rectifier section. This arrangement minimizes the undesirable magnetic effects of the reactor and lowers the locomotive's center of gravity.

A water pump and mechanism for regulating operating temperatures of the rectifier tubes are also located in the rectifier compartment. A three-way regulating valve insures control of water temperature at approximately 43-50 deg C, with the heat being dissipated by a water-to-air heat exchanger in the equipment blower compartment. The blower is a large, two-stage radial type. It draws air from both sides of the locomotive just under the roof and directs it downward through the rectifier heat exchanger and into an air duct in the cab underframe, from whence it is distributed to the transformer, reactors, and traction motors.

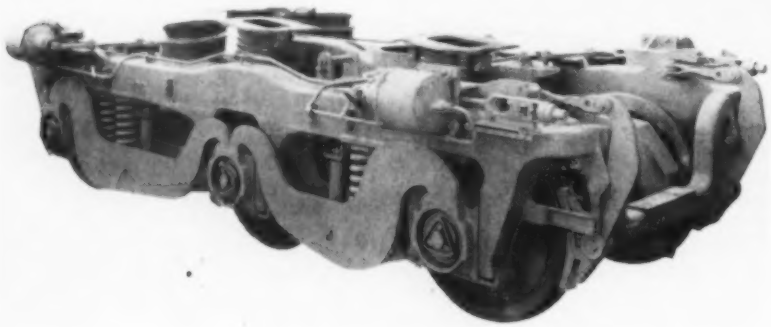
Most of the control equipment is contained in two sections, separated by an inside aisle and located just behind the rectifier section. Controls are accessible from either the inside or outside of the locomotive, simplifying inspection and maintenance.

The structure of the control and rectifier compartements provides support for the resistor compartments on the roof, thus allowing the length of inter-connecting leads and bus bars to be kept to a minimum. The arrangement also keeps the control equipment free of heat dissipated from the resistors.

The nose of the equipment hood houses the air compressor, governor, and control air reservoir. This compartment is also accessible from either side as well as from the nose. Compressor is a Westinghouse Air Brake two-stage, motor-driven model, rated at 224 cfm and 140 psi at 725 rpm. It is equipped with suction unloading valves to enable continuous operation of the compressor, which is important when single-phase, induction type motors are used.

The locomotive control system is designed for 65 volts and can be operated from the 155-amp-hr battery for a period of time. Battery and air reservoirs are underneath the platform—a desirable location from the standpoint of maintenance and ventilation, especially of the battery.

Atop the cab roof are two pantographs of the light-weight Faively design not previously used in the United States, although it is not new to railways elsewhere in the world.



The power truck is similar to that used on GE diesel-electrics.
Bogie à moteur similaire à celle utilisée sur GE diesel-électriques.
Das Triebdrehgestell gleicht dem der GE-Dieselelektrik-Lokomotiven.
El bogie motor es análogo con el de los trenes diesel-eléctricos GE.

A group of six rectifiers is placed on each side of the hood.
Un groupe de six redresseurs est placé à chaque côté du capot.
Eine Reihe von sechs Gleichrichtern sitzt auf jeder Seite der Haube.
Un juego de 6 rectificadores se encuentra en ambos de la cubierta.

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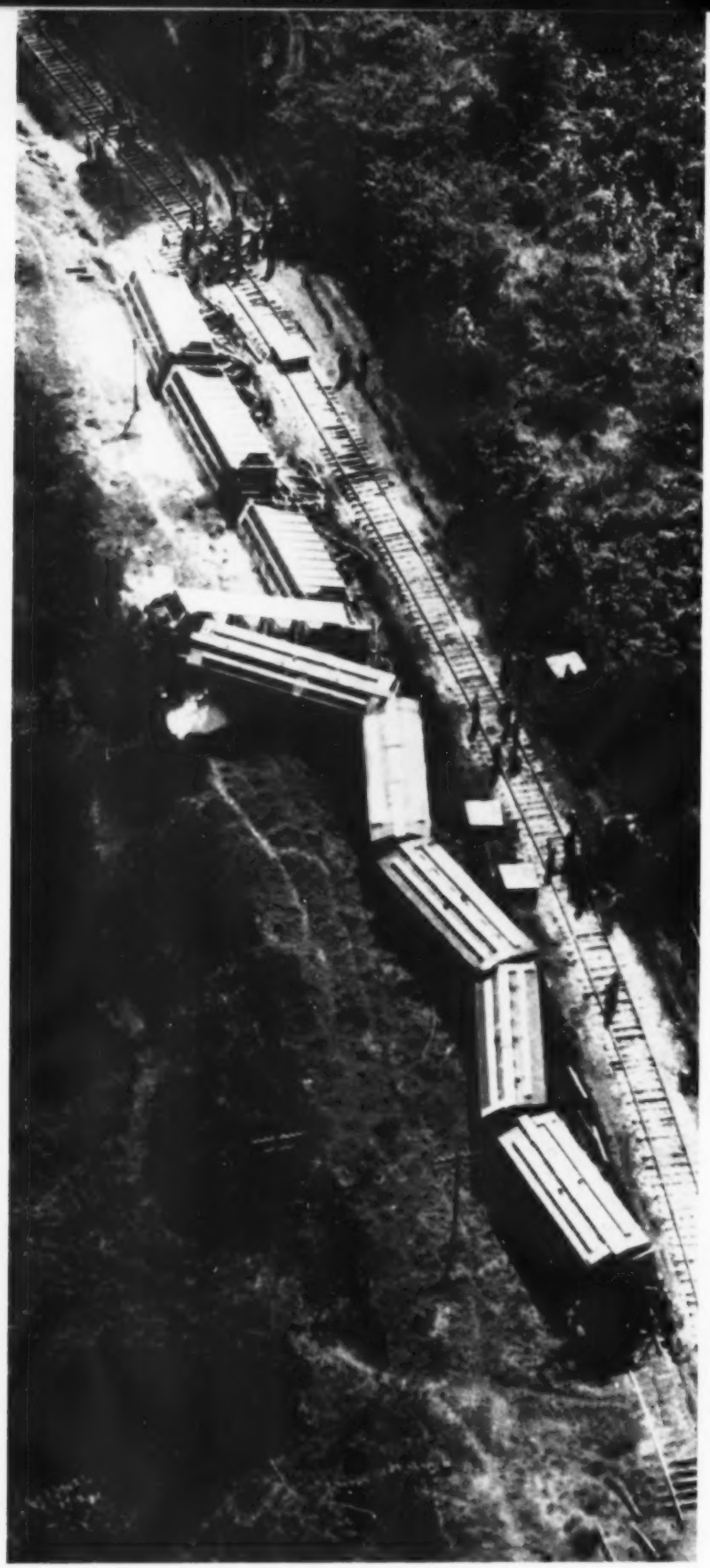


Aluminum

What would happen to aluminum rolling stock in a derailment? Nothing more than would occur to cars built of conventional materials, say Aluminium Limited officials —and the company has some tangible evidence to support its claim.

The survival strength under stress of rolling stock constructed of aluminum was tested, literally quite by accident, when eight such cars were involved in a recent derailment on the Jamaica Railway Corporation line.

The cars are owned by Alumina Jamaica Limited (Aljam)—a member of the Aluminium Limited complex—and are used, along with other rolling stock, to transport some 50,000 tons per month of alumina from Aljam's plant at Kirkvine to Port Esquivel, on the Caribbean Sea, for ocean carrier shipment to Canada. Some 21,500 tons a month of process materials needed at the plant move in the reverse direction.

The cars used to transport alumina are restricted to a maximum load per axle of 16,257 kg, or a weight on rail of 65,028 kg for a car using two 50-ton bogies. The maximum uphill trailing load is 480 short tons. Downhill it's 1110. Together with the 16,257-kg maximum axle load limit, this puts a premium on light weight, high capacity equipment.

Originally, six steel hopper cars were used, each weighing 22,362 kg and having a capacity of about 42,638 kg. The aluminum cars which now comprise the greater part of Aljam's hopper car inventory weigh only about 14,515 kg each, which gives them a capacity of 50,350 kg —or about $8^1/_2$ tons more per car than the steel cars.

The distance from port to plant is about 50 km, much of it through hilly country, with grades up to 3 per cent.

The derailment occurred on a stretch of track bearing a maximum speed limit of 64.36 km/h. The driver, testifying before the board of inquiry established to determine the cause of the derailment, said the speed at time of derailment was between 56.3 and 64.36 km/h. The board's official findings had not been published at time of this writing.

The make-up of the train was as follows:

Car No. 204—aluminum hopper (Gregg Car Co., Ltd., Belgium)
207—aluminum hopper (Gregg)
220—aluminum hopper (Marine Industries, Ltd., Canada)
284—steel hopper

Hoppers Pass Derailment 'Test'

243—aluminum hopper (National Steel Car Corp., Ltd., Canada)
285—steel hopper
222—aluminum hopper (Marine Industries)
209—aluminum hopper (Gregg)
237—aluminum hopper (National Steel Car)
214—aluminum hopper (Marine Industries)
Five steel tank cars (empty)
One box car (empty)

The derailment tore up about 90 m of track. All ten loaded cars (i.e., the eight aluminum and two steel hopper cars) were derailed and damaged. The engines, the five empty steel tank cars and the empty box car remained on the track.

Aluminum hopper car No. 243 was jackknifed between steel hopper cars No. 284 and No. 285. However, officials of Aluminium Limited report that the welded center sill of car No. 243 did not crack, in spite of the high forces involved.

"Damages to the aluminum cars appear no worse than those suffered by the steel cars," stated an officer of the

CONTINUED

Wagons-trémie Aluminium Passent L'Epreuve

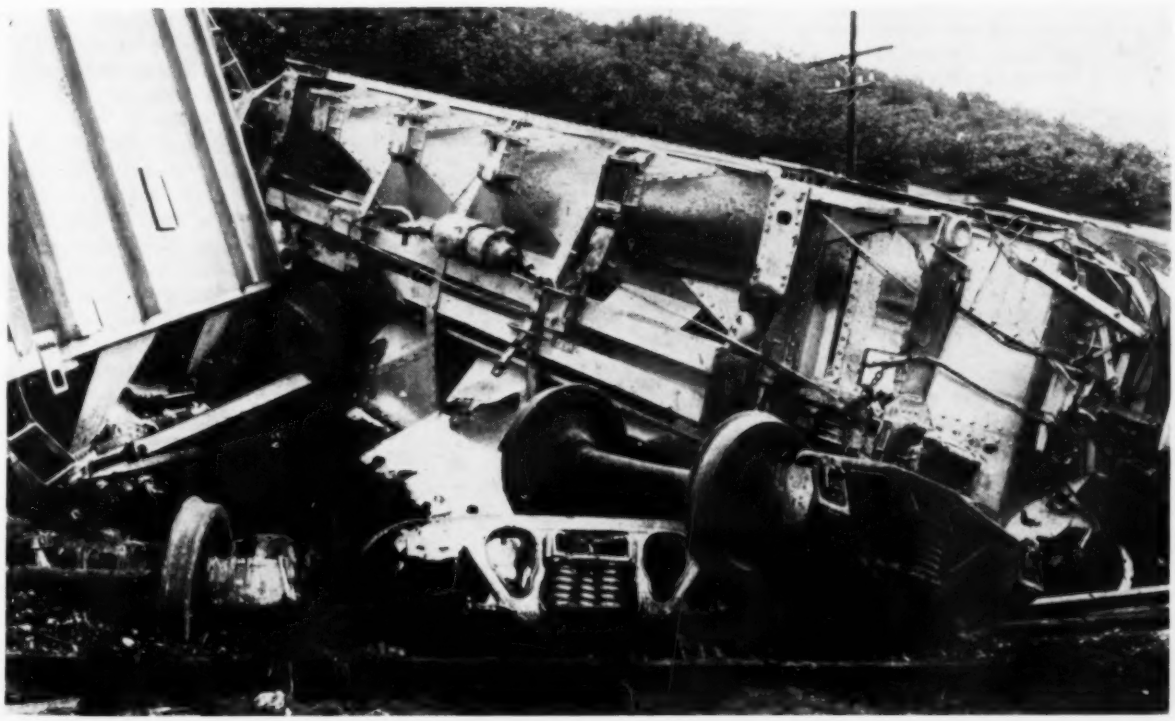
Qu'arriverait-il au matériel roulant en aluminium au cours d'un déraillement? Selon la direction de Aluminium Limited rien de plus qu'avec le matériel conventionnel. Le matériel roulant en aluminium fut soumis accidentellement à une épreuve dure lorsque huit wagons en aluminium furent engagés dans un déraillement sur la ligne de la Jamaica Railway Corporation, prouvant ainsi les assertions de la direction.

Aluminium Schüttgutwaggons Bestehen Prüfung

Was passiert mit Rollmaterial aus Aluminium wenn es entgleist? Genau dasselbe, was mit Waggons aus dem üblichen Material passiert, sagen Vertreter der Aluminium Limited—und die Firma hat für ihre Behauptung verschiedene zwingende Beweise. Die Druckwiderstandsfähigkeit des Aluminium-Materials wurde rein zufällig einer Prüfung unterzogen, wie acht solcher Wagen auf der Strecke der Jamaica Railways Corporation bei einer Entgleisung betroffen waren.

Vagones-tolva de Aluminio Resisten a Pruebas

¿Qué ocurriría al material rodante de aluminio en caso de un descarrilamiento? Nada más que a vagones construidos de materiales convencionales, dicen oficiales de la Aluminium Limited—y la compañía puede producir evidencia palpable. La resistencia de material rodante construido de aluminio se puse a prueba—literalmente por accidente—cuando ocho de tales vagones descarrilaron en la línea de la Jamaica Railway Corporation.



Car No. 243, a loaded aluminum hopper, fifth behind the locomotive, was jackknifed between loaded steel hopper cars 284 and 285.
Wagon No. 243, wagon-trémie aluminium chargé, cinquième derrière la locomotive, était télescopé entre wagons-trémie acier chargés 284 et 285.
Nr. 243, ein geladener Aluminium-Schüttgutwagen, fünfter hinter der Lok, wurde von geladenen Stahlwaggons, 284 und 285, zusammengedrückt.
El vagón No. 243, un vagón-tolva de aluminio cargado, fué apretado entre los vagones-tolva de acero cargados 284 y 285.

Damaged cars were thoroughly surveyed to determine if repairs could be made locally. Car 243, below, received heavy damage, but longitudinal weld of center sill held.

Wagons endommagés furent rigoureusement inspectés pour déterminer des réparations locales éventuelles. Wagon 243 fort endommagé, mais le joint longitudinal central a tenu.

Die Wagen wurden sorgfältig geprüft, ob Ausbesserung an Ort und Stelle möglich wäre. Wagen 243, war schwer beschädigt, aber die Längsschweissung des Gerüstes war intakt.

Los vagones averiados fueron examinados para determinar si se los podía reparar localmente. La soldadura longitudinal del vagón 243, estropeado en alto grado, resistía.

company. He reported further that the welded construction of the aluminum cars proved its worth in that all welds stood up except in places where direct collision was involved.

Five of the eight aluminum hopper cars suffered such slight damage that repairs were effected in the Aljam workshop at Port Esquivel.

Cars No. 207, No. 220 and No. 243 were damaged extensively. It was nevertheless considered that they could be restored to "as good as new" condition in the Port Esquivel workshop by undergoing repairs as follows:

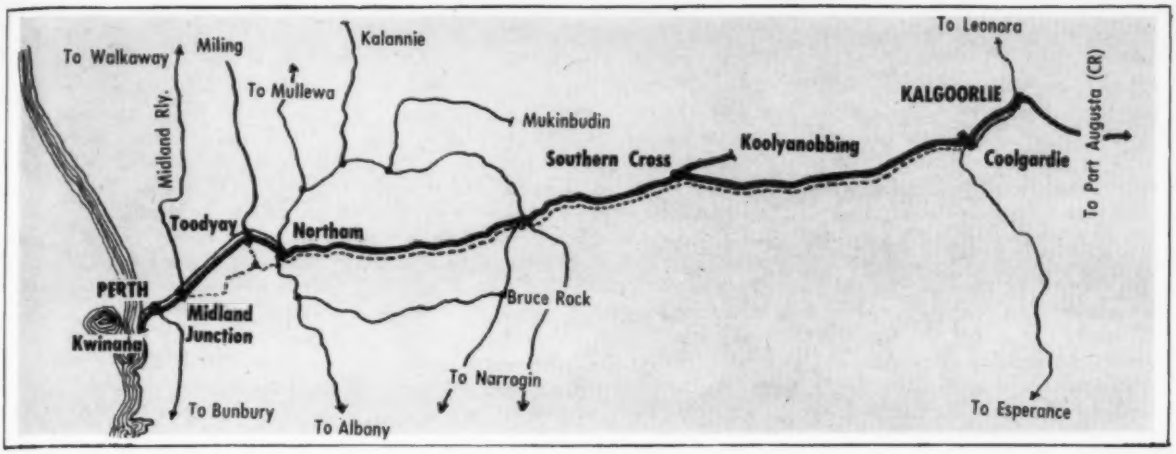
• **Car 207 (B-end)**—Cut and splice one flange of center sill for about 2.4 m from end of car (this particular center sill was built up from plates and angles); straighten the other flange; chip and reweld cracks at about 15 locations; replace one side bearing and support. **(A-end)**—De-twist center sill; replace the side bearing and support; splice 1.8 m of end sill, 1.5 m of side sill and 0.9 m of side plate; chip and re-weld cracks at about six locations; replace about 1.5 m of end plate and one roof sheet.

• **Car 220 (B-end)**—Splice or replace 1.07 m of side sill, end sill, two diagonals, all vertical angles and 1.5 m of side plate; cut center sill 0.7 m from end and straighten it. **(A-end)**—Replace steel ladder steps; chip and re-weld at about three locations for the whole car.

• **Car 243 (B-end)**—Splice bottom flange of bolster; de-twist center sill; straighten one buckle at bottom flange by controlled heating and sledgehammer; replace 1.5 m of two side sills, end sill, diagonals, all vertical posts; replace slope sheet from bolster up; rebuild two hoppers. **(A-end)**—Straighten buckle at bottom flange of bolster; replace 1.5 m of side sill, end sill, one corner post, three vertical posts, 1.5 m of side plate, end plate and four hopper gates.

Labor time for repairing the three cars would be about 1,000 hours. Estimated repair costs would total only a fraction of the purchase price of new cars.

Alumina Jamaica provides its own rolling stock, although traffic is handled by the Jamaica Railway Corporation. The first use of aluminum hopper cars came with purchase of 13 such cars from the Gregg Car Co., Ltd. in 1954. Another lot of 16 cars was ordered from Marine Industries, Ltd., in 1956; and a third lot of 17, in 1958, from National Steel Car Corp., Ltd.



This is how the proposed standard-gauge (1.435-m) line between Kalgoorlie and Perth will be superimposed on the existing system of the Western Australian Government Railways. Thick lines indicate new standard-gauge tracks; thin lines, the existing narrow-gauge (1.067-m) tracks. Broken lines show the tracks which are to be removed after standardization.

Voici comment la ligne à voie normale de 1.435-m proposée entre Kalgoorlie et Perth sera superimposée aux systèmes existants en Australie Occidentale. Les lignes épaisses montrent les nouvelles voies normales; les lignes fines les voies étroites existantes de 1.067-m; les lignes brisées indiquent les voies à enlever après la standardisation.

Auf diese Weise wird die vorgesehene Normalspurstrecke zwischen Kalgoorlie und Perth dem bestehenden System der west-australischen Staatsbahn angepasst. Die dicken Linien geben die neuen Normalspurgleise an; die dünnen Linien bezeichnen bestehende Schmalspurgleise (1.067 m); Gleise, die nach der Normung entfernt werden, sind punktiert.

Esta es la manera en que la línea de trocha normal (1,435 m) entre Kalgoorlie y Perth se sobrepondrá en el sistema existente de los Ferrocarriles del Estado de Australia. Las líneas gruesas indican las nuevas vías; las líneas tenues las vías existentes (1,067 m). Las líneas punteadas indican las vías que serán removidas.

Australia Continues Gauge Battle

Latest proposal for minimizing Australia's railway gauge problem calls for construction of a new 644-km standard-gauge (1.435-m) line between Kalgoorlie and the Western Australian seaboard.

The resulting industrial development of Western Australia, and the new line's effect on the operating pattern of the narrow-gauge (1.067-m) Western Australian Government Railways and of other Australian railways will be matters of great importance to the nation's economy.

The proposed new standard-gauge line will link Kalgoorlie with Perth, Fremantle and Kwinana (see map). Kalgoorlie is the railhead of the Commonwealth Railways' 1783-km, 1.435-m line from Port Pirie across the Nullarbor Plain, which includes the world's longest stretch of straight track (478 km). Perth is the state capital of Western Australia; Fremantle, 19 km distant, is its seaport; and Kwinana, another 19 km from Fremantle, is the site of current extensive industrial development.

Probability of the new line has been a deciding factor in the decision to establish a £20-million integrated iron and steel industry in Western Australia. The

CONTINUED

Nouvel Écartement Proposé pour l'Australie

L'essor du transport par rail en Australie a été enrayé parce que les lignes principales sont à écartements différents. Pour y remédier on propose: une nouvelle ligne de 644 km à voie normale de 1.435-m de Kalgoorlie à la côte occidentale pour relier la ligne existante transcontinentale de 1.435-m (voir cette page), ainsi qu'une gare nouvelle à double-écartement à Melbourne (voir page 34).

Neue Spurweite für Australien vorgesehen

Eine zweckmässige Entwicklung des Bahntransportes in Australien wurde bisher durch unterschiedliche Spurweiten der meisten Strecken gehemmt. Pläne, die daraus entstandenen Probleme zu lösen, umfassen: 1) Eine neu projektierte 644-km Normalspurstrecke (1.435 m) von Kalgoorlie zur Westküste als Anschluss an eine bestehende transkontinentale Normalspurlinie (diese Seite) und einem neuen Bahnhof in Melbourne (Seite 34).

Propósito para Nueva Trocha en Australia

El desarrollo del transporte ferroviario en Australia ha sido refrenado, porque los principales ferrocarriles tienen trochas diferentes. Los planes para atenuar los problemas incluyen: (1) una nueva línea de 644 km de trocha normal de Kalgoorlie a la costa occidental y que se unirá con una línea existente transcontinental de 1.435 mm (esta página); una nueva estación de trocha doble en Melbourne (página 34).

double-barreled development scheme, which is expected to prove most advantageous to the state and the Commonwealth alike, is the subject of an agreement, already ratified by legislation, between the Western Australian government and the Broken Hill Proprietary Co., Ltd.

That company, known throughout Australia as BHP, is the nation's major iron and steel producer. With six plants in four states, it turns out more than 3.5 million tons of steel ingots per year, which puts Australia third among British Commonwealth countries, and 16th in the world, in steel production.

The agreement provides for leasing to BHP of large iron ore deposits in the Koolyanobbing area, 378 km from Perth. In return, BHP will undertake, at Kwinana, a construction program involving:

- A blast furnace with a capacity of not less than 450,000 tons of basic iron per year.
- A steel-making plant.
- A rolling mill, to bring the total capacity of existing facilities up to 330,000 tons per year.
- Ancillary plant and other developments.
- Additional wharf facilities.

The BHP agreement, however, is contingent on a further agreement between the Western Australian and Commonwealth governments for construction, at an estimated cost of approximately £35 million, of the proposed Kalgoorlie-Kwinana standard-gauge railway, plus a branch to the ore deposits.

Standard-Gauge Proposals

The agreement with BHP stipulates that the standard-gauge line must be built, because it is vital to the new industry's economic operation, both as regards movement of raw materials inbound and finished products outbound. The agreement further provides that the blast furnace must be ready by 1968, or by completion of the standard-gauge line, whichever is later; and that the steel plant and rolling mill must be in operation by 1978, or 10 years after completion of the blast furnace.

Construction of the new line is currently under consideration by the Australian Federal government.

Major work involved in the standard-gauge proposal would be the removal of almost all the existing 1.067-m track between Kalgoorlie and Perth, and its replacement by 1.435-m track. Existing narrow-gauge line would be retained, however, between Kalgoorlie and Coolgardie (39 km) to provide a connection between the Kalgoorlie-Leonora and Coolgardie-Esperance branches.

Between Coolgardie and East Northam (467 km) the narrow-gauge line would be lifted and replaced with wider rails. A new 53-km standard-gauge branch would be built between Southern Cross and Koolyanobbing.

Entry to the Perth metropolitan area from East Northam (see map) would follow a new location through Toodyay and the Avon River valley to obtain easier grades of 1 in 200 (0.5 per cent) in place of the 1 in 40 sections (2.5 per cent) now abounding between Northam and Midland Junction. The new section will be laid with mixed-gauge double track, and will connect with existing lines at Midland Junction.

The Great Southern branch from Albany, which joins the present main narrow-gauge line at Spencers Brook, 97 km from Perth, will be extended about 10 km westward to East Northam, where a narrow-gauge yard will be built.

The existing 1.067-m track from Northam, through Spencers Brook and Clackline to Midland Junction, rendered superfluous by the new line through Toodyay, will be removed.

A complex network of tracks for trains of both gauges has been outlined to connect Midland Junction, Perth, Fremantle, Kwinana and a proposed marshaling yard at Welshpool. This involves both narrow- and standard-gauge lines between Midland Junction and Perth on the present location via Guildford. Standard gauge also will be provided from Perth to Fremantle and Kwinana paralleling existing narrow-gauge tracks. Both standard- and narrow-gauge lines will be available from Midland Junction to the Welshpool yards, continuing on through Cannington and Jandakot to Kwinana, thus completing the Midland Junction-Fremantle-Kwinana triangle.

Connections for both gauges will be provided also from Welshpool to Perth via the Armadale line and East Perth. Other existing narrow-gauge tracks in the area will remain unaltered.

Potential Traffic

It is expected that the iron and steel project will substantially increase traffic and revenues of the Western Australian Government Railways. Movement of one million tons of iron ore per year between Koolyanobbing and Kwinana would

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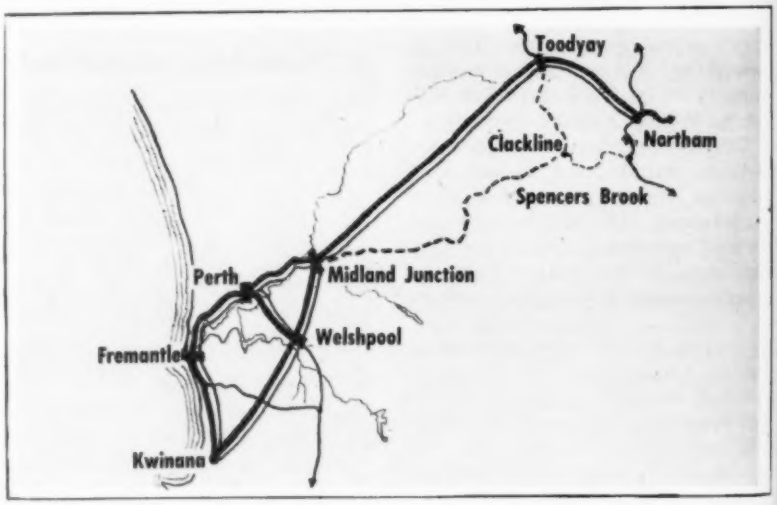

Entry of the new line into the Perth metropolitan area via Toodyay, and the extent of the proposed standard-gauge (1.435-m) trackage between Midland Junction and Kwinana, are shown in this map. Tracks to be removed are indicated by broken lines.

L'entrée de la nouvelle ligne à la région métropolitaine de Perth via Toodyay ainsi que la voie normale 1,435-m proposée entre Midland Junction et Kwinana sont indiquées dans ce plan. Les voies à enlever sont désignées par les lignes brisées.

Auf dieser Karte ist der Anschluss der neuen Linie an den Stadtbezirk Perth über Toodyay sowie der Umfang der vorgesehenen Normalspurgleise (1.435 m) zwischen Midland Junction und Kwinana angegeben. Die Gleise, die entfernt werden müssen, sind punktiert.

La entrada de la nueva línea en la zona metropolitana de Perth por Toodyay y la extensión de la vía de trocha normal (1,435 m) propuesta entre Midland Junction y Kwinana han sido indicado en este mapa. Líneas punteadas indican las vías que serán removidas.

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boost revenue by £1,800,000; one and one-half million tons by £2,400,000; and two million tons by £3,200,000.

The BHP agreement provides, however, for that company to mine from the Koolyanobbing deposits more ore than will be required for the Kwinana operations. This foreshadows its transport to other states, and increases the need for a standard-gauge line.

The Kalgoorlie-Perth line is currently carrying about one million tons of general freight per year, and this traffic is gradually increasing. Superimposition on this of one, two or three million tons of ore will change the economics of the WAGR system, and permit the state government to present to the Commonwealth an attractive case for financial aid on the standard-gauge project.

The proposal now under consideration is based on a South Australian agreement under which the Commonwealth provides all money and bears 70 per cent of the cost. The remaining 30 per cent will be borne by the state, and paid to the Commonwealth from revenue in 50 equal annual installments to liquidate the cost. The state would also pay interest on the amount outstanding at the end of each year. It is anticipated that the money would become available as a result of economies and added revenues, totaling £1,600,000 per year, which are expected to accrue to the WAGR from savings resulting from standardization and movement of one million annual tons of ore.

[The financial proposals, however, are being criticized by other Australian states, which contend that gauge-standardization projects in their territories should be given priority. See "World Report," p. 10.]

The WA Minister for Railways, C. W. Court, has indicated that surveying and preliminary work on the new lines will cost about £100,000 during 1961, and perhaps as much as £500,000 in 1962. The rate of expenditure will accelerate to a peak in 1967 and 1968, when the line is being completed and rolling stock built.

BHP has committed itself to use the standardized system for not less than 30 years from the date when Kwinana output is begun, and to use only rail facilities for movement of iron ore. The company will also provide rapid loading and unloading equipment.

It is expected that ore will be moved in trains of 3000 tons, but no details have yet been announced about quantity of rolling stock or motive power required for standard-gauge trains on the WAGR, or on the manner in which this traffic will be co-ordinated with narrow-gauge operations.

Trans-shipment Points

The standard-gauge proposal envisages establishment of trans-shipment points at Coolgardie, for the Leonora and Esperance branches; at Merredin, for the Wyalkatchem, Narrogin via Corrigin, and Kondinin lines; and at East Northam, for the Albany line and branches and wheat-belt lines to the north. What effect this will have on traffic originating from or destined to the narrow-gauge branches, from standpoints of both operations and costs, remains to be seen.

It would appear, however, that, where the Albury-Melbourne and Broken Hill-Port Pirie gauge-standardization projects (IRJ, April, p. 9) will remove break-of-gauge points, the Western Australian proposals will eliminate one, at Kalgoorlie, and add three.

There are, however, several factors which make it difficult to compare this with other standardization projects from the break-of-gauge standpoint. The first is that most passenger traffic to and from areas served by the affected branch lines is already handled by the WAGR's extensive bus services direct to Perth. The second is that much of the freight traffic originating or bound to narrow-gauge branches in the southern and southwestern parts of the state can be handled over narrow-gauge routes to Perth and Fremantle because of the large number of inter-connecting lines running in a general east-west direction. The only lines for which direct narrow-gauge connection with Perth will be unavailable after standardization are the Leonora and Esperance branches, and the volume of traffic handled on them would not justify retention of the narrow-gauge between Coolgardie and Northam.

Melbourne Station

An ultra-modern multi-story station building, dual-gauge platforms and parking facilities for 300 automobiles are the principal components of a new interstate passenger terminal which will be completed at Spencer Street, Melbourne, Australia, in time to greet the first standard-gauge express train from Sydney when the new 1.435-m line from Albury to Melbourne is opened at the end of 1961 (IRJ, April, p. 9). The station will be used also by Victorian Railway trains with a gauge of 1.6 meters. Existing station buildings north of Collins Street will be demolished.

A new platform, 410 meters long, will be built between the present No. 1 platform and Spencer Street. It will be served by a three-rail track for both standard-gauge trains (to Sydney and Brisbane) and broad-gauge trains (to Adelaide). The existing No. 1 platform track used by major interstate and country trains will be converted to dual gauge. This will permit operation of two standard-gauge expresses with a short time interval between departures, which is expected to be of great advantage during seasonal and holiday traffic peaks.

The new station building will be located on part of the existing car park, adjacent to Spencer Street. It will include a basement, ground floor, and two upper floors, all devoted to railway activities. Total height of the structure could, however, be considerably increased by possible sale or lease of air rights for an office building over the station.

The ground floor of the station will contain an enclosed concourse, approximately 18 by 55 meters, faced by ticket offices, information booth, baggage room and concession areas. A ramp from this concourse will lead to a subway connecting with train platforms.

The basement will include a second concourse with space for additional concessions and passenger service facilities. The first floor above ground level will house a 144-seat cafeteria and station waiting room, while the next floor will accommodate station staff.

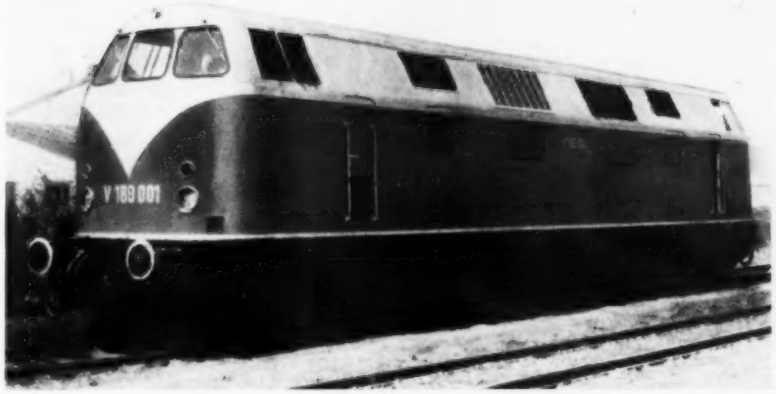
The car park, reserved for train travelers and those accompanying them, will hold three times as many cars as the present area. Parking will be free, in direct contrast to the general custom of charging for parking at airports.

Other facilities in the new Spencer Street terminal will include access roads and bridges; other new train platforms; a new rail-car depot; new inward parcels and lost property offices; and additional passenger car sidings.

The air rights area which is available above the station site could provide commercial interests with potential Spencer Street frontage of more than 300 meters. Several distinct areas are open for development, both above and adjacent to the new station building. They may be allocated to more than one lessee, but any lease will be for a period of 99 years.

V180 Specifications

Weight	80 metric tons
Axle load	20 metric tons
Distance between bogie center pins	12,200 mm
Wheel diameter	1000 mm
Maximum width	3060 mm
Maximum height	4185 mm
Minimum curve	100 meters
Maximum speed	120 km/h
Planned performance (level track) with trains of:	
310 metric tons	120 km/h
550 metric tons	100 km/h
1100 metric tons	80 km/h



East Germany's New Diesel-Hydraulic

With the cessation of steam locomotive building in East Germany, the German State Railways have undertaken a replacement program which involves both diesel and electric designs. Two standard diesel models—the V60 and V15/18—were completed some time ago. A third—the V180, corresponding in some respects to the German Federal Railways' V200—has just appeared in prototype form.

The V180 diesel-hydraulic main-line locomotive—the most powerful unit yet built in East Germany—is intended to form part of a pattern of standard designs which will replace steam power. The prototype, built at the Karl Marx plant in Babelsberg—corresponds in performance and ability to Class 50 and Class 23 steam locomotives. It is intended primarily for passenger service, but is suitable for freight service when required.

A double-cab BB unit, the V180 incorporates two 12KVD21A-type four-stroke V-type 12-cylinder engines, each developing 950 hp at 1500 rpm. Cylinder bore is 180 mm; piston stroke, 210 mm. The engines are water-cooled and pressure-lubricated. Each, without blower, weighs 4200 kg; measures 2625 mm long, 1490 mm wide and 1630 mm high.

Power is transmitted by cardan shafts from each engine to separate hydraulic transmissions, each of which has three torque converters. Control equipment is electrical, and two locomotives can operate in multiple. Equipment is fully protected by a system of warning lights in the cab. Serious defects which might lead to engine or transmission damage bring into operation an automatic device which shuts off power and applies brakes. Compressed air is provided by two compressors.

The train-heating boiler which will be installed in production models will have an output of at least 600 kg/steam per hour. It will be fully automatic, and will serve also as an engine pre-heater before starting.

Special attention has been paid to lightweight and standardized components in design and construction of chassis, bogies and superstructure.

Diesel de l'Allemagne de l'Est

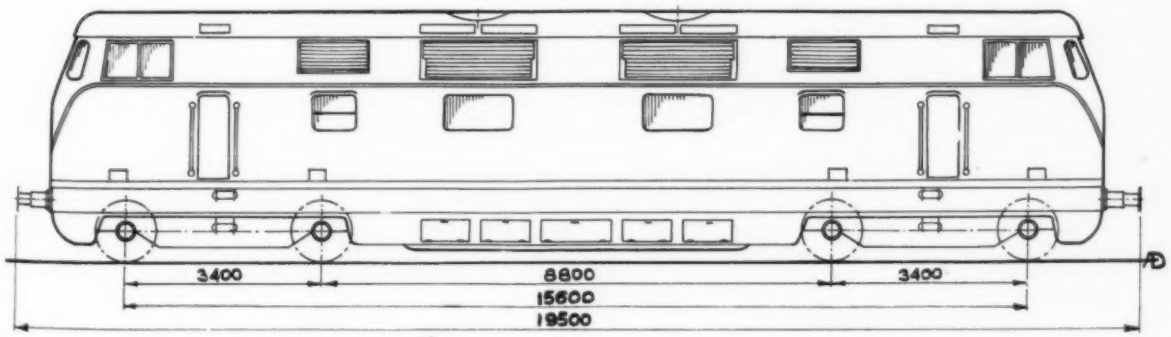
Un prototype de la locomotive diesel-hydraulique la plus puissante de l'Allemagne de l'Est—la V180—vient d'être complété. C'est un des projets standard qui remplacera la vapeur aux chemins de fer de l'état.

Diesel in der DDR

Ein Prototyp der leistungsfähigsten dieselhydraulischen Lok der DDR—die V180—wurde vor kurzem fertiggestellt. Es ist eine der verschiedenen Standardbauarten, die die Dampflok ersetzt.

Diesel de Alemania Oriental

Se ha acabado un prototipo de la locomotora más fuerte de Alemania oriental—la V180—. Es uno de los diferentes diseños que reemplazarán las locomotoras de vapor en los ferrocarriles del Estado.



RAILWAY OF THE MONTH:

Switzerland's BLS: Bern Rolls It

A student, seeking the essence of the Swiss railway industry in one conveniently observable package, would very likely find himself studying the railways of the Canton of Bern—the Bern-Lötschberg-Simplon and its three associated smaller lines.

For, with the exception of narrow-gauge and rack working, the Bernese group includes virtually every ingredient of Swiss railroading: main-line international freight and passenger traffic; busy suburban service and rural branch-lines; electrification and magnificent mountain scenery. Our hypothetical student would find himself studying a rarity as well—a main-line railway performing an indispensable role as a link in Europe's rail network while remaining outside the state-owned railway system, and one that manages to lay aside a small surplus at the end of the year.

Though the four railways of the Bernese system—Bern-Lötschberg-Simplon, Bern-Neuchatel, Gurbetal-Bern-Schwarzenburg and Simmentalbahn—are different in nature, and though they are all individual companies so far as organization and finances are concerned, all share a common management, the Berner Alpenbahn Gesellschaft. Equipment is pooled for maximum utilization, and all are effectively controlled by the Canton of Bern.

The Lötschberg line itself is only a part of the system—its 105-km operated route makes up less than half, and its 199 track-km only 57 per cent, of the system's total. But it is by far the most important. It accounts for three-fourths of both gross tonnage and net freight traffic; in 1959 it provided 74 per cent of the system's total operating revenues, and 138 per cent of its operating surplus, leaving a net operating income of 5,039,097 Swiss Francs for the system after more than 2,000,000 francs in operating losses for the other three lines were covered.

The reason for the importance of the BLS—indeed, for its very existence—is evident from the name: lying midway between the Gotthard and Simplon lines of the Swiss Federal Railways, it provides the Canton of Bern with its only direct route to the south and through the Simplon Tunnel to Italy.

The planning of the BLS began as early as 1881—the year before the Gotthard tunnel's completion—and took eighteen years under the direction of the line's "spiritual father", W. Teuscher. Though a concession for the line was granted in 1891, it was not until the opening of the Simplon tunneling in 1906—three years after Teuscher's death—that a corporation was organized and the work begun. Within a month of the com-

olls Its Own

pany's founding work began on the Lötschburg tunnel, the line's major engineering work, under the direction of Dr. A. G. Bühler. The tunnel, 14,612 meters long, was "holed through" on 31 March, 1911, and completed on 22 April of the following year.

Meanwhile, work was under way on the approaches to the tunnel. From the north work proceeded from Frutigen, an older line from Spiez having been purchased in 1907; on the south the start of the approach was at Brig, north portal of the Simplon tunnel. The approaches to the tunnel are themselves notable engineering works; the 20-km northern slope climbs 417 meters to the north portal at Kanderstegg, with the help of a "double bowknot" built partly in a helicoidal tunnel above Kandergrund.

The southern ramp, climbing the north slope of the Rhone valley for most of its length, rises 538 meters in the 26 km between Brig and Goppenstein. Both approaches required extensive tunneling, the north ramp having 12 tunnels and the southern approach 30. The line also includes 10 avalanche-protection galleries; tunnels and galleries on the two approaches total 13.1 km, and with the Lötschberg itself and other tunnels, 38,743 meters of the BLS route—a third of the line's total length—is underground.

In 1913 the BLS acquired the Thunerseebahn, connecting Thun and Bönigen via Spiez and Interlaken, and the first electric operation through the tunnel took place on 3 June 1913, 42 days before the line's official opening. It's outlet to the south finished, Bern gained a mainline route to and from France and the north when the Münster-Lengnau-Bahn—an isolated 13-km stretch including the Grenchenberg Tunnel—was opened in 1915, completing the BLS's own system.

The BLS today is virtually entirely electrified, along with its affiliated lines, using the standard Swiss AC system of 15 kv at 16-2/3 cycles. At the close of 1959 a single steam locomotive remained on the roster, though unused, while the line had four two-axle internal-combustion tractors for maintenance operations.

The Spiez-Frutigen line was electrified in 1910, the first Swiss line to use the now-standard 15-kv low-frequency system. The line was chosen to serve as a testing-ground for the electrification of the main

La Berne–Lötschberg–Simplon: Suisse

Situé à mi-chemin entre les lignes Gotthard et Simplon des Chemins de Fer Fédéraux Suisses, la ligne privée Bern-Lötschberg fournit au canton de Berne l'unique route directe vers le sud et à travers le tunnel du Simplon, vers l'Italie. Composée de quatre lignes—la Berne-Lötschberg-Simplon, Berne-Neuchâtel, Gurbetal-Berne-Schwarzenburg et Simmentalbahn—La BLS fait un bénéfice modeste, mais n'est décidément pas une compagnie à gros dividendes. La situation géographique vitale de la BLS lui assure une place d'importance durable dans le réseau de transport suisse et européen. Ces dernières dix années le trafic de marchandises a augmenté de 145 pourcent et comme les relations commerciales entre les nations deviennent de plus en plus étroites, on peut s'attendre à ce que la BLS aura à faire face à un trafic de plus en plus intense dans l'avenir. Presqu'uniquement à voie unique, la société compte augmenter sa capacité en doublant la voie. On entamera prochainement la première phase en doublant la section Speiz-Frutigen. Le financement s'effectuera par des sources privées. Les frais estimés à environ 10 millions de Frs.S. seraient probablement plus élevés si la ligne n'avait pas été projetée et construite pour le doublage éventuelle de la voie.

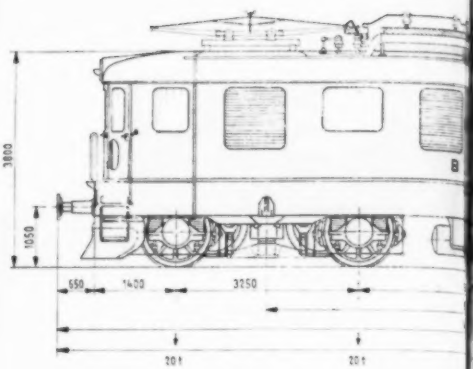
Schweiz: Bern–Lötschberg–Simplon

Auf halben Wege zwischen den St. Gotthard- und Simplon-Strecken der Schweizerischen Bundesbahn liegt die private Bern-Lötschberg-Simplon-Bahn, die einzige direkte Route, die den Kanton Bern mit dem Süden und, durch den Simplon-Tunnel, mit Italien verbindet. Mit ihren vier Linien—Bern-Lötschberg-Simplon, Bern-Neuchâtel, Gurbetal-Bern-Schwarzenburg und Simmentalbahn—bucht die BLS einen bescheidenen Gewinn, zahlt jedoch keine Dividenden. Aber die geographisch wichtige Lage der BLS sichert ihr auch weiterhin eine lebenswichtige Funktion im Verkehrsnetz der Schweiz und Europas. Der Güterverkehr ist in den letzten 10 Jahren mit 145% stark gestiegen und da die Wirtschaftsbeziehungen der Länder stets enger werden, kann man annehmen, dass die BLS in den kommenden Jahren einen weiter zunehmenden Verkehr verarbeiten muss. Bis jetzt noch beinah vollkommen eingleisig, plant die Bahnverwaltung, ihre Leistung durch Doppelbetrieb zu erhöhen. Sehr bald soll mit der ersten Doppelstrecke im Speiz-Futigen-Sektor begonnen werden. Finanzierung wird aus privaten Quellen angesucht. Die Kostenschätzung kommt auf ungefähr 10 Millionen Franken und würde noch höher sein, wenn nicht schon eventueller Doppelbetrieb geplant und angelegt worden wäre.

El Ferrocarril Suizo Bern–Lötschberg–Simplon

A medio camino entre las líneas Gotthard y Simplon de los Ferrocarriles Federales suizos la línea Bern-Lötschberg-Simplon une el cantón de Bern con su única ruta directa al Sur y, por el túnel Simplon, a Italia. El BLS es una combinación de cuatro ferrocarriles—el Bern-Lötschberg-Simplon, Bern-Neuchâtel, Gurbetal-Bern-Schwarzenberg y el Simmentalbahn—, saca poco provecho y, como se comprende, no reparte dividendos. Pero la ubicación vital del BLS le da una importancia duradera en la red de transporte de Suiza y de Europa. En los últimos diez años el tráfico de mercancias ha aumentado en un 145 por ciento intensificándose más y más las relaciones económicas entre las naciones, se puede contar con un crecimiento aun más grande en los años que vienen. El ferrocarril que consiste casi por completo de vía sencilla, tiene el propósito de aumentar la capacidad por la construcción de doble vía. Dentro de poco se inaugurará esta obra en la sección Speiz-Frutigen. Fuentes privadas financiarán la obra. El costo que se estima en unos millons de fr.s. sería probablemente más elevado, si la línea no hubiera sido planeada y construída para doble vía.

Modern AC Electric



Ae 8/8 Locomotive: 8800-hp Bo—Bo + Bo—Bo, 160 tons, maximum tractive effort 46,000 kg, maximum speed 125 km/h.

BLS CONTINUED

line when completed, while the Swiss Federal Railways administration was still debating the relative merits of three-cycle low-voltage AC (already used through the Simplon tunnel), direct current, and 15-kv AC. When the Brig-Frutigen line was opened in 1913, it was the first standard-gauge mainline section in Switzerland to be electrically operated throughout.

The Thun-Spiez section began electric operation in 1915, and the overhead was extended to Bönigen five years later; electrification of the MLB did not take place until 1928.

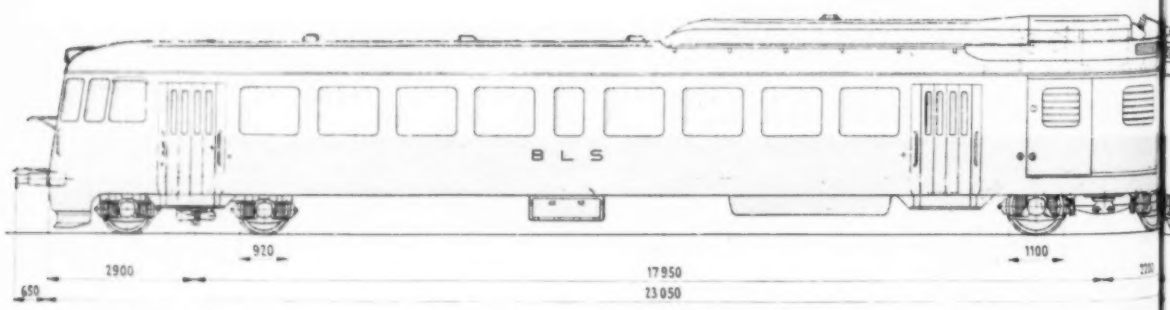
Early BLS locomotives resembled those used elsewhere at the start of AC electrification, with large, slow-speed motors driving through side rods, and several rod-driven units remain on the BLS and the associated lines, including the unit used in the first tests. Between 1926 and 1943 eight 5280-hp locomotives of 1—Co+Co—1 wheel arrangement were purchased, and starting in 1944 eight 4000-hp Bo-Bo units were placed in service.

To meet the needs of increasing traffic the BLS raised the maximum tonnage for the Lötschberg line from 140 to 900 tons. To avoid double-heading, the line put into service in 1959 an 8800-hp locomotive, consisting in effect of two of the existing Bo-Bo units modified for single-end operation and semi-permanently coupled back to back. By essentially doubling a design already proved and in service, maximum interchangeability of components is possible. Electrically the new locomotive is virtually identical to the older Bo-Bo units except for a 10 per cent increase in the horsepower of the traction motors. In mid-1960 the line ordered a second locomotive of the same design for 1962 delivery from the same builders, Swiss Locomotive and Machine Works and Brown-Boveri.

The basic soundness of the design was demonstrated in comparison tests carried out in November between an Ae 4/4 Bo-Bo unit and locomotive BB-20104 of the SNCF, a dual-frequency unit with single-motor coupled-axle motor bogies and DC traction motors fed through rectifiers. Tests were carried out on the Frutigen-Kandersteg stretch with its 2.7 per cent grades. Tractive effort of the 81-ton BLS unit, 18 years old in design concept but fitted with recently-developed equipment for the control of adhesion weight on the front axles of the bogies when starting, was approximately nine per cent less than the newer and more powerful 88.5-ton SNCF locomotive.

For local and lightly-loaded passenger service the BLS uses electric railcars, having seven units altogether. The five most recent—82-ton sets built by Swiss Industrial Company between 1954 and 1957—are two-car units with four of the eight axles powered. Accommodating 142 passengers, the light-steel, all-welded sets have an hourly rating of 1200 hp and can haul two light weight passenger cars on the 2.7 per cent grades of the Lötschberg section.

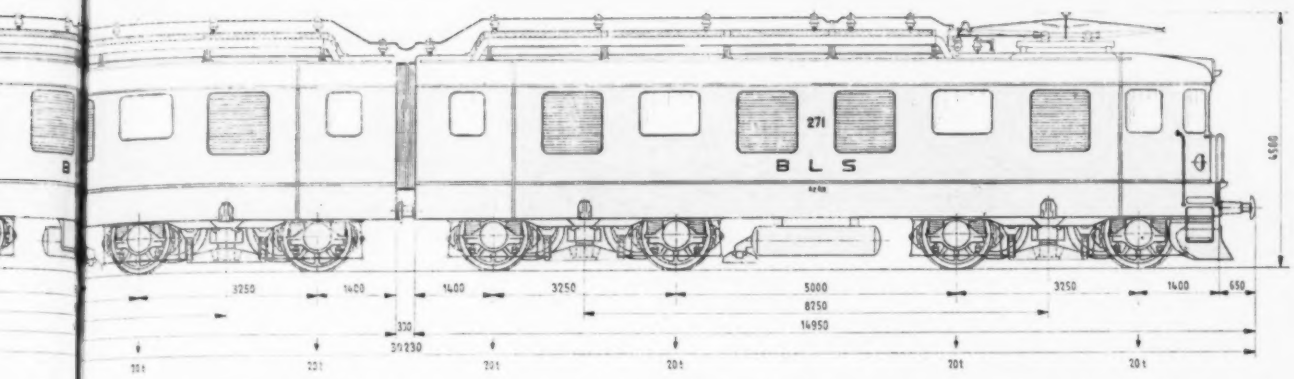
For shunting the BLS has one three-axle electric unit and nine electric tractors—seven with two axles and two with



ABFe 4/8 Railcar Set: 1200 hp, 82 tons, maximum tractive effort 6000 kg. SIG-Brown Boveri; 5 units built 1954-57.

Autorail ABFe 4/8: 1200 CV, 82 tonnes, effort de traction maximum 6000 kg. SIG-Brown Boveri; 5 éléments construits de 1954-57.

Locomotives and Railcars Keep BLS Traffic Moving



Locomotive Ae 8/8: 8800-CV Bo—Bo + Bo —Bo, 160 t, effort de traction maximum 46,000 kg, vitesse max. 125 km-h.

Ae 8/8 Lok: 8800-PS Bo—Bo + Bo—Bo, 160 t, höchste Zugkraft 46,000 kg, Höchstgeschwindigkeit 125 km/h von Brown-Boveri und SLM.

Locomotora Ae 8/8: 8800-CV Bo—Bo + Bo —Bo, 160 t, esfuerzo de arranque máximo 46,000 kg, velocidad máxima 125 km/h.

three axles. At the end of 1959 three two-axle electric tractors were on order, one diesel tractor and two electric-diesel tractors.

Total utilization of motored units on the BLS, including use of equipment owned by other lines, ammounted to 3,074,207 unit-km in 1959, of which 2,793,258 were with BLS equipment.

Passenger Service

Passenger traffic is important to the BLS; passenger trains accounted for 69.4 per cent of all 1959 train-km, and passenger-train car utilization, in terms of axle-km, was almost exactly half of the total.

Altogether 4,767,044 passengers were carried on the Lötschberg line in 1959; passenger-km totalled 99,306,667; average trip was 20.83 km, average revenue per passenger Fr 2.37; total passenger revenue was Fr 11,277,129. Traffic over the MLB section added another 1,996,915 passengers to the total, but revenue from this source (Fr 1,679,288) pulled down the average per passenger to Fr 1.92.

Passengers travelling on multiple-ride tickets make up about a third of the BLS total, but contribute only 11 per cent of total passenger revenues. Single tickets provide 54 per cent of the passengers and 73 per cent of receipts, while group travel accounts for 14 per cent and 16 per cent respectively. First-class travel accounted for 5.87 per cent of the total passengers carried, 8.55 per cent of total passenger-km, and provided 13.46 per cent of revenue from passenger traffic.

Passenger traffic and revenues show a pronounced seasonal pattern. Passenger revenue for the entire line, including the SBB-operated MLB, hit a 1959 peak of Fr 1,411,466; in contrast, February revenues in the same year were only Fr 769,825. The general pattern follows a relatively smooth cycle from a winter low to a summer high. A sharp exception to the pattern occurs in December, when holiday traffic and winter-sports traffic combine to form a sudden high point. December revenues in 1959 soared to Fr 1,393,545, making revenue for the month second only to that of the previous August.

To handle its passenger traffic BLS owns six passenger railcars or sets (one railcar is a baggage unit) and 95 non-powered cars, all but three of them of four-axle construction and a good percentage of lightweight welded steel; the total seating capacity of the 101 units is 7354, and at the end of 1960 14 additional lightweight cars were on order from Schlieren.

Baggage and postal traffic is also important, and the line has 25 cars for the service—a heavy railcar and 24 cars, six of four-axle and the balance of two-axle construction. Post and baggage transport amounted to 1,574,639 ton-km in 1959, of which 1,340,639 were on the Lötschberg and the rest on the MLB; the traffic accounted for 15 per cent of all passenger-train ton-km. Baggage traffic totalled 31,619 and post 29,786 tons; revenues were Fr 795,262 and 1,188,590 respectively, average receipts per ton-km 1.15 and 1.35.

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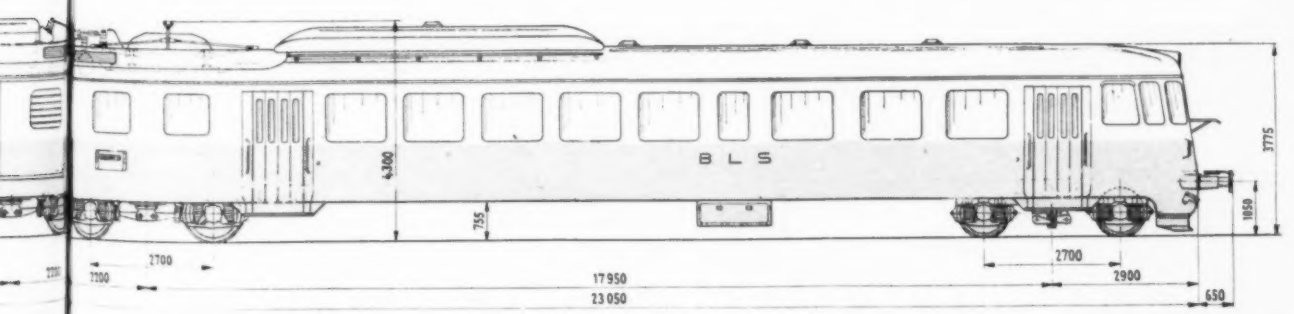

ABFe 4/8 Schienenzug: 1200 PS, 82 t, höchste Zugkraft 6000 kg. SIG-Brown-Boveri; 5 Einheiten der Baujahre 1954-57.

Rama ABFe 4/8: 1200 CV, 82 toneladas, Fuerza de arranque máxima 6000 kg. SIG-Brown Boveri; 5 construídas en 1954-57.

BLS is vital international passenger artery; traffic is up 36 per cent from 1950.
BLS artère vitale internationale pour voyageurs; trafic augmenté de 36 % depuis 1950.
BLS ist eine vitale internationale Verkehrsader; der Verkehr hat seit 1950 mit 36 % zugenommen.
BLS es vital arteria internacional de pasajeros; aumento del tráfico desde 1950 en un 36 %.

BLS CONTINUED

Freight Traffic

If the Lötschberg's role as a bridge carrier is evident in passenger traffic, it is unmistakable in freight: 82.6 per cent of the total tonnage is in transit, neither originated nor terminated on the BLS; 16.17 per cent is between BLS and foreign points, and a tiny 1.23 per cent is solely between points on the line. Total 1959 tonnage was 3,194,905, of which 10,045 tons were accounted for by the transport of animals. Ton-km totalled 163,411,897 with receipts of Fr 20,787,918; freight trains accounted for 758,730 locomotive-km and 821,182 train-km—30.57 per cent of the total. Ratio of payload to gross tonnage was 34 per cent.

The line carries a limited amount of container traffic (see "World Poll," IRJ March, p. 14), mostly in foreign-road or privately-owned containers; though it has five containers of its own, BLS is guarded in its enthusiasm for container traffic. One special source of traffic for the BLS, as for other Swiss railways, is "land ferry" service for private motor vehicles through the Lötschberg Tunnel. Started in 1955 with a total of 1112 automobiles and 715 motorcycles carried, the service has grown steadily and handled over 7000 autos and 1000 motorcycles in 1959, with a revenue of Fr 155,000.

Freight rolling stock consists of 230 two-axle cars—162 closed, 45 open, and 16 special cars.

In addition to its rail services BLS operates passenger lake services on both the Thunersee and Brienzersee. Of the two, the Thunersee service is the most important, and eight ships—three steam and five motor—are used; Brienzersee traffic is handled by one steamer and three motor vessels. Relative importance shows in the passenger statistics: Thunersee ships carried 1,189,346 passengers in 1959, those on the Brienzersee only 380,721. Lake traffic, as might be expected, shows an even more extreme seasonal pattern than rail traffic, hitting its peak in July and dwindling to almost nothing in the winter.

Financial Standing

From an operating standpoint the BLS is a profitable venture: total operating expenses for 1959 were Fr 34,380,268, of which 15,628,399 was for personnel costs. Operating income for the same year was 41,865,110, of which 35,728,187 was from actual transportation revenues and the rest from miscellaneous sources. From the resulting surplus of 7,484,842, 3,301,938 went for depreciation, 1,195,000 into reserve funds, and 1,101,461 for miscellaneous costs. The major part of the remaining amount went for interest on fixed debt, largely for service of two mortgages dating from 1942 and totalling 83,670,000 of which 45,920,000 is held by the Swiss government and 37,750,000 by the Canton of Bern. Interest on the two mortgages amounted to 2,521,200. With other relatively minor expenses, the profit for the year amounted to only 20,358.76, bringing the accumulated profit to 137,744.24.

Bern-Neuchâtel

The Bern-Neuenberg-Bahn, one of the three lines jointly operated with the BLS, provides the most direct connection between Bern and Neuchâtel. Its 43-km line (39.38 km owned, the rest used under trackage rights) carried 2,435,575 passengers and 328,597 tons of freight in 1959.

The BN performs, in effect, a dual role: it serves, in the first place, as a route for Swiss Federal Railways passenger trains between its two terminal cities. Motive-power utilization statistics bear this out; of the 117,558 locomotive-km operated in passenger service during 1959, more than two thirds—82,144—were by Swiss Federal units. While only 22 locomotive-km in freight service were by SBB power, Swiss Federal locomotives still accounted for more than a third of the BN total.

In its own traffic BN is primarily a railcar operation; of the total 878,119 unit-km recorded by powered equipment in 1959, 670,870 were by railcars. BN owns seven heavy railcars—two passenger and five baggage—and four lightweight cars or sets: a single unit, a four-bogie, two-car set, and two three-bogie articulated units. As with all of the lines in the group, railcars and locomotives are pooled with other component companies.

If passenger service is important to the Lötschberg line, it is even more so to the BN. Passenger trains, including foreign-road operations, accounted for 84.62 per cent of all train-km, and an impressive 92.62 per cent of car axle-km in 1959. The railcars and the 13 passenger cars owned —all four-axle and seven of light-steel construction—handle a heavy suburban and commuter traffic; 57.76 per cent of the BN's 1959 passengers were holders of multiple-ride tickets. Income from this source, however, is not in proportion to the traffic; with an average revenue of only Fr 0.44 per person, multiple-ride ticket-holders contributed only 24.54 per cent of the Fr 2,569,455 total passenger receipts. Single tickets made up 36.62 per cent of the total carried and 68.41 per cent of the revenue; the rest was accounted for by group travel. Baggage and parcels amounted to only 3300 tons, with receipts 32.82 per ton; 3512 tons of post were handled, with a revenue averaging 56.23 per ton.

Freight traffic, including animals, was 321,785 tons in 1959, amounting to

7,126,538 ton-km and bringing revenue of Fr 1,455,526 for the year. The line owns 59 freight cars, all two-axle, 35 closed and 24 open.

The BN is not a profitable operation; its operating deficit of Fr 815,615 for the year, in spite of Federal and cantonal subsidies amounting to 672,153, resulted in a total deficit for the year of 199,538, and an accumulated deficit of 2,799,272.

Simmentalbahn

Of all the lines in the BLS group the 35-km Simmentalbahn (SEZ) is the closest to a traditional branchline. The result of a 1944 merger between the Spiez-Erlenbach (organized in 1895, opened in 1897, and electrified in 1920) and the Erlenbach-Zweisimmen (organized in 1899, opened in 1902 and electrified in 1920), the SEZ is not only the shortest but easily the most lightly-trafficked line of the group; 1959 passenger traffic totalled only 806,458 persons, and freight tonnage was a modest 93,947.

Like the BN, the SEZ devotes considerable energy to passenger service—91.33 per cent of all train-km in 1959. In contrast to the other jointly-operated lines, however, multiple ride ticketholders make up only a small proportion of the total—14.34 per cent, while single-ticket travel amounts to over three-fourths, and group travel makes up 9.71 per cent. This perhaps accounts for the fact that of all the lines, other than the Lötschberg itself, the Simmental is the least deficit-ridden. With an operating loss of Fr 238,998, aided by a small subsidy of 54,857 from the Swiss government and the Canton of Bern, the year's deficit was 200,960 and the cumulative deficit only 352,197.

The GBS enjoys the dubious distinction of having the highest operating deficit of all the lines in the system. The longest of the three co-exploited lines, it has more stations per km than any of the others and the rare feature—for a Swiss railway—of having not a single tunnel. Like the SEZ the GBS resulted from a 1944 merger of two previous lines.

Passenger traffic is heavy—34,581,104 passenger-km in 1959—but an unhealthy 65.99 per cent of the traffic is from holders of multiple-ride tickets who contribute an average revenue of only Fr 0.39 per ride and 37.04 per cent of all revenue from passenger service. Group travel is insignificant, and single-ticket passengers make up 31.34 per cent of the total number.

Freight traffic is relatively heavy—346,956 tons in 1959 (including baggage and post), 5,185,016 ton km—and brought in income of Fr 1,791,038, an average of 5.16 per ton. But the total operating deficit for 1959 was Fr 1,391,132. With the aid of 526,410 in operating subsidy the year's losses were Fr 870,412, bringing the cumulative deficit to 2,790,221.

The BLS and the Future

The vital geographic position of the Lötschberg line assures it a continuing place of importance in the transport network of Europe. In the past 10 years passenger traffic has grown by 36 per cent; the same decade saw a 96 per cent growth in net freight tonnage.

Most significant, perhaps, is the growth of transit freight traffic over the mountain section—transit carload freight for 1960 was a staggering 145 per cent above that

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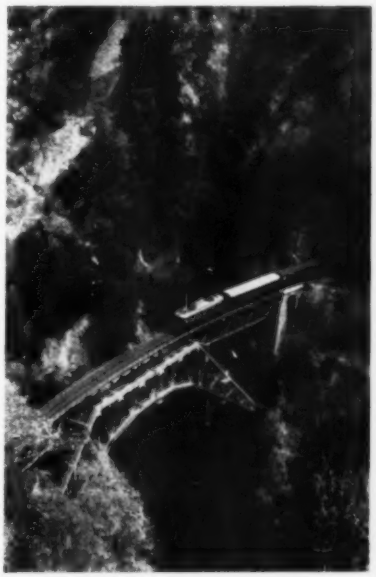
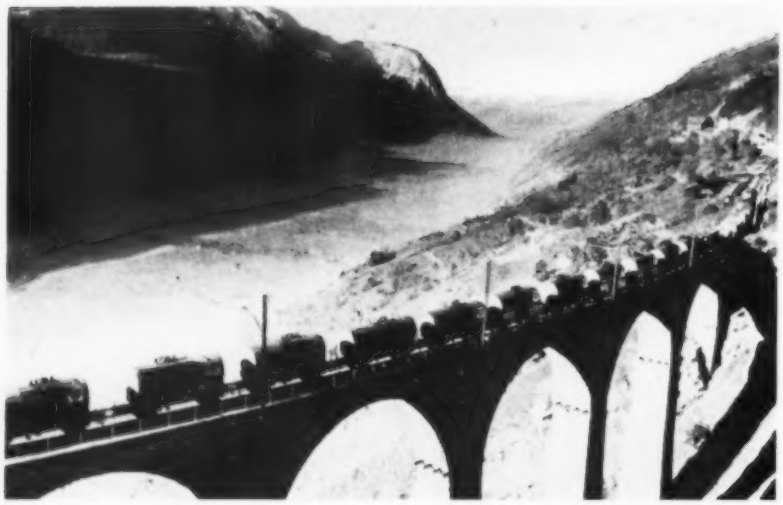


Agricultural traffic on associated lines: cattle on SEZ, sauerkraut on GBS.
Trafic agriculturel sur lignes associées: bestiaux sur SEZ, choucroute sur GBS.
Landwirtschaftsgüter auf BLS-Strecken: Vieh bei der SEZ, Sauerkraut bei der GBS.
Tráfico agrícola en líneas asociadas; ganado en SEZ, choucroute en GBS.

Auto transport through Lötschberg tunnel has grown steadily since 1957.
Augmentation croissante du transport automobile, tunnel Lötschberg.
Der Autotransport durch den Lötschberg Tunnel ist seit 1957 gestiegen.
Desde 1957 el transporte de coches ha crecido más y más por el túnel Lötschberg.



Transit freight shows steady growth; BLS plans to double-track line.
Augmentation constante marchandises en transit; double voie projetée par BLS.
Der Transitgüterverkehr steigt weiter; BLS planen Doppelgleisstrecke.
Tráfico de cargo en tránsito crece continuamente; BLS planea construir doble vía.

of 1950. As the European economy continues to prosper and, as economic relations between countries grow steadily closer, the BLS can be expected to handle increasingly heavy traffic in the years to come.

The management of the system is active in working to attract even more traffic, both internationally and locally; a major effort of its commercial department is directed toward industrial development along its own lines. While freight traffic plays perhaps the major role in the Lötschberg's future plans, an active publicity and passenger service department works to attract more passengers as well.

The most important plans for the future, however are in the area of engineering. Still almost entirely single track, the BLS, to take its full place in the growing international traffic, plans to increase its capacity by double-tracking. The first stage—doubling of the Spiez-Frutigen section—is expected to begin soon, and the necessary financing—amounting to some Fr 10 million—is now being sought from private sources.

When the next stages—Frutigen-Kandersteg and Goppenstein-Brig—are carried out the present management will be grateful for the foresight of the original builders. The Lötschberg tunnel is already double-tracked, and the engineering of the rest of the stretch was carried out to facilitate eventual doubling. Many of the smaller tunnels, though carrying only a single track, are bored to double-track dimensions; others were so built that portals and roof lining are to double track standards, and with the removal of additional rock within the tunnels the lining can be carried down to floor level without complete rebuilding and with a minimum of interruption of traffic.

Some major bridges as well are already double-track width.

Even with these advantages, however, the cost of doubling the line will be high—estimates range between Fr 70 million

The Bern–Lötschberg–Simplon System—Vital Statistics

	BLS (inc. MLB)	BN	SEZ	GBS	System
Route-kilometers	118	43	35	52	248
Track-kilometers	199.580	53.127	43.421	60.066	356.194
Bridges—number	142	26	36	22	226
—length	2952 m	616 m	684 m	393 m	4645 m
Tunnels—number	49	5	4	—	58
—length	38,743	2048	372	—	41,163
Stations and halts	32	16	16	24	88
Electric locomotives	25	4	4	6	39
On order	1	—	—	—	1
Heavy railcars	1	7	—	1	9
Light railcars and sets	6	4	3	4	17
Tractors, electric	9	—	—	—	9
On order	3	—	—	—	3
Tractors, diesel	4	2	—	—	6
On order	1	—	—	—	1
Tractors, electric-diesel, on order	2	—	—	—	2
Passenger cars	95	13	8	6	122
On order	14	—	—	—	14
Baggage cars	24	2	3	—	29
Freight cars	230	59	44	79	412
Service cars	90	10	6	7	113

and 90 million. The financial means to carry out the work appear beyond the ability of the company itself, and it seems likely that financing for this portion of the work will have to be secured through the Swiss Confederation and the Canton of Bern. But the BLS management is convinced that the work is necessary, and there seems to be little doubt that it will, in time, be carried out.

Writing in the **Technische Rundschau** of Bern on the occasion of the 50th anniversary of the "holing through" of the tunnel, BLS Director Robert Bratschi makes a strong case for the continuing importance of the BLS, but observes wryly that "The BLS is no dividend-paying railway." It seems unlikely that it ever will be, in a corporate sense.

Like other railways in Europe the BLS is subject to heavy regulation in the matter of tariffs; much of its passenger traffic—and especially that of the jointly-operated lines—is carried at unremunerative "social" fares established by law. In the matter of freight rates—now, like those of the Swiss Federal, and other Swiss lines, laid down by the government—the BLS would like to have greater freedom, especially in the area of contract and volume rates such as those permitted to other European railway systems, but the likelihood of this is not great in the foreseeable future.

A logical question is why the BLS has never been absorbed into the Swiss Federal Railways, as have all the other main lines in Switzerland. Perhaps the answer lies in part in the local pride of Bern. The Lötschberg is Bern's own railway; Bern—Teuscher was a Cantonal official—conceived it and built it. Bern owns most of it today, and seems quite satisfied with the way it is operated and by its contribution to the city and canton. Bern, in short, has never wanted to sell.

An additional factor now is the close interdependence of the four Bernese lines; the BN, GBS and SEZ are all in essence extensions of the BLS, its dependent family. BLS provides their management, their shop facilities, and much of their equipment. It also, like a good parent, helps to support them. And while the Swiss Federal has from time to time shown a willingness to take over the BLS itself, one company official observes "Without the BLS, what would we do with the other three?"

Meanwhile, the BLS remains—even as an independent organization run on a private company basis—an integral part of the Swiss railway system. Relations with the Federal system are close and cordial, and even where there is competition, it is friendly competition.

The jointly-operated lines—BN, GBS and SEZ—continue to lose money year after year, and though the BLS earns a small profit (so small, someone has observed, that "if they hired two or three more people it would be gone") its surplus will probably never cover the deficits of the other three.

In a sense, however, the long-run deficit is a matter of accounting. Though the owners—ten per cent of the shares of the BLS are held by the Confederation, 40 per cent by the Canton of Bern, and the rest privately or by the local communities—might be said to have lost Fr 1,250 551 during 1959, at the same time the BLS returned Fr 2,521,200 to the Confederation and Canton in the form of interest on long-term obligations.

It is the intangible dividend, however—in the form of the system's contribution to the economy of the nation and the area it serves—that make the BLS and its "family" a sound investment for its owners. And those dividends have not only been immeasurable in the last half century, they assure the future growth and health of a unique and important railway.

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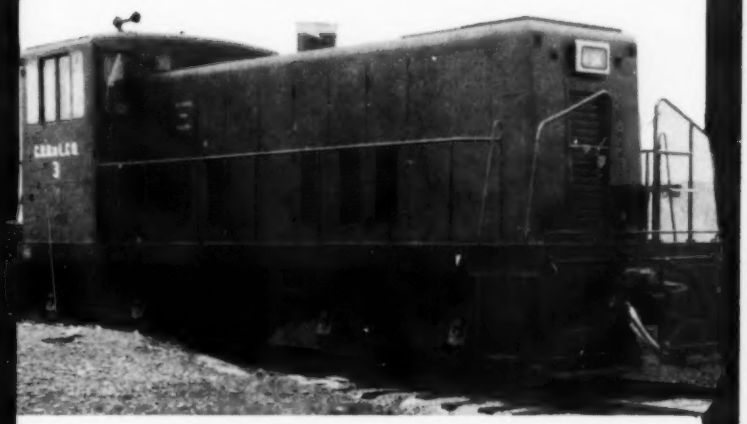

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Dr. Richard Beeching

New Chairman of

At a time when the British Railways are being subjected to considerable criticism at home, the appointment of Dr. Richard Beeching to the chairmanship of the British Transport Commission is providing BR's critics with new ammunition.

At the heart of the present controversy are two main issues: Dr. Beeching's lack of experience as a professional railwayman, and his salary.

Dr. Richard Beeching, ARCS, BSc, DIC, PhD, CIMechE, AIM, FInstP, was born 21 April 1913. He took his honors degree at the Imperial College of Science and Technology. Before World War II, he was associated with the Fuel Research Station and the Mond Nickel Co., Ltd. During the war he served with the Ministry of Supply. In 1948 he left his post as Deputy Chief Engineer of Armaments Design with the Ministry of Supply to join Imperial Chemical Industries, Ltd. He later joined the board of ICI Fibres Division and went to Canada in 1953 for two years as vice-president of ICI (Canada), Ltd. He was appointed chairman of ICI Metals Division in 1955 and joined the ICI Board in 1957.

At present Dr. Beeching is a technical director of Imperial Chemical Industries, and is being released from his company for a period of five years. His direct connection with British Railways has been limited to membership on the Stedeford Committee. This was the advisory group under the chairmanship of Sir Ivan Stedeford, appointed in 1960 by the Minister of Transport to examine the structure and finance of the BTC.

Interest in Dr. Beeching's salary lies in the fact that it is considerably more than that of the existing chairman and the same amount as he has been receiving as a technical director of ICI Ltd. Dr. Beeching takes up his duties on 1 June and he is also chairman-designate of the new British Railways Board.

Last month he was interviewed by IRJ's London Associate Editor, Robert Spark. Because he had not, at that stage, taken up his appointment his comments on a number of subjects had, of necessity, to be general.

His appointment stemmed from his membership on the Stedeford Committee and he accepted the BTC chairmanship for a complex of reasons.

"It was so obviously an important job —a job that had to be done," said Dr. Beeching. "It was a challenge, which you could not turn down."

In the five years which he will be chairman, Dr. Beeching's basic task will be to try and resolve BR's financial plight and put the system on at least a break even basis. He has no detailed plan and will have considerable latitude—without which he would undoubtedly achieve little. It will also be necessary for him to be as free as possible from political interference and to have the confidence of the Minister of Transport.

On the magnitude of his new job, Dr. Beeching has no illusions. "I don't think it is an impossible task even though there are very great problems to be solved."

He has the great advantage of bringing a completely fresh mind to the subject, uncluttered by preconceived ideas on how a railway should be run. Although still on the outside as far as a working knowledge of BR is concerned, he has, as a result of his work on the Stedeford Committee, some idea of the root causes of BR's present position.

As both a scientist and a manager, Dr. Beeching is particularly experienced in the analysis of facts and statistics on which to base policy decisions. He regards his scientific training as an asset, but he does not think of himself as a management expert. For example, he sees the need for accurate information on the cost of moving traffic of different kinds. Only when detailed studies of this nature have been made will there emerge an over-all picture of the shape of a profitable railway system.

A priority task for Dr. Beeching will be to try and change the present unfavorable image of BR which is generally held in Britain. On this he comments: "I have ideas in my mind about the things to be done but how quickly they can be done, I hesitate to say."

One of the problems here is that the railway, in Dr. Beeching's view, presents both its merchandising and its manufacturing plant to the public. The average industrial concern, he points out, does not face this problem—it is only the product which the public sees; not its means of production.

Equally difficult is the task of getting a sense of unity into an organization with half a million employees. Such an organization is, says Beeching, "too big for an individual to think of in terms of belonging. The average employee's loyalty is much more local."

of the BTC

The proposed accentuation of the independence of the BR Regions will assist this process, Dr. Beeching thinks, although such independence should not be allowed to interfere with the benefits of standardization. When thinking in terms of the railway system, he notes, it must be considered as a whole.

One thing is certainly in the new Chairman's mind and that is the necessity of pruning uneconomic routes and services, while driving hard for any increase in those forms of traffic which are best carried by rail. For BR to be profitable it must be of a size to suit present day requirements.

From these reflections and comments there emerge a number of salient facts:

- BR's problem is basically one of management.
- The system may not be the right size or have the right pattern of operation to suit present day transport needs.
- Top management must have accurate information at its command on which to base decisions.
- Decentralization is desirable, but should not be carried to the point where it seriously reduces the advantages of simplified operation of the system as a whole.

Dr. Beeching appears to be a determined and talented contender to shatter the widely-held belief that only a railwayman can successfully manage a railway. If he succeeds, in five years, in putting BR's house in order he will be worth every penny of the other controversial aspect of his appointment—his £24,000 a year salary.

It seems likely that Dr. Beeching's scientific background and his wide managerial experience will have a stimulating effect on the rather narrow and vertical management structure of BR. He is obviously alive to the necessity of having accurate information on the system to assess the biggest areas of loss. With such information he can direct the means of eliminating the deficit. This may well require extensive changes in the size, scope and activities of the system. This —like CIE's reorganization, described in our April issue—is an operation with a time limit. Dr. Beeching will be closely watched—by BR staff, by other railway managements and by the British public.

He should be worth watching.

Dr. Beeching se Charge de la BTC

Au moment où les British Railways sont sujet à des vives critiques, la nomination du Dr. Richard Beeching comme président de la British Transport Commission pourvoit les critiques des BR de nouvelle munition. On lui reproche surtout son manque d'expérience professionnelle d'homme des chemins de fer et son salaire. Les défenseurs de Beeching soulignent toutefois qu'il apporte une variété de talents qui pourraient révitaliser les British Railways.

Dr. Beeching übernimmt die BTC

In einer Zeit, in der die British Railways grosser Kritik ausgesetzt sind, ist die Ernennung des Herrn Dr. Beeching als Präsident der British Transport Commission Wasser auf die Mühlen der Kritiker. Streitpunkt sind sein Mangel an Erfahrung als Eisenbahnfachmann und sein Gehalt. Aber Beechings Verteidiger weisen darauf hin, dass er unterschiedliche Fähigkeiten mitbringt, die eine Wiederbelebung der British Railways zur Folge haben können.

El Dr. Beeching al Frente de la BTC

Ahora que los Ferrocarriles británicos sufren censuras vehementes, el nombramiento del Dr. Ricardo Beeching como presidente de la British Transport Commission es agua para los molinos de los críticos. Se discuten su falta de experiencia ferroviaria y su salario. Sus protectores señalan que tiene una diversidad de talentos que podrían efectuar la revivicación de los Ferrocarriles británicos.

IRJ Associate Editor Robert Spark interviews new BTC Chairman Beeching.
Robert Spark, rédacteur de l'IRJ, interviewe Président Beeching de BTC.
IRJ Mitarbeiter Robert Spark interviewt neuen BTC-Präsidenten Beeching.
El co-redactor Robert Spark de la IRJ se entrevista con el Sr. Beeching.

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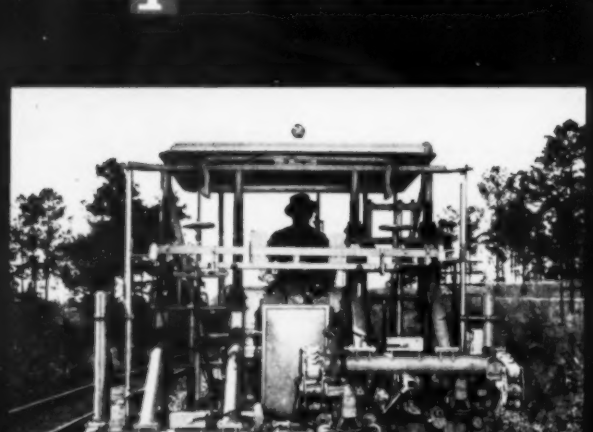

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WORLD POLL CONTINUED

extend the application of radio on the basis of present principles. In particular, we propose to introduce radio for communication between the driver and the train guard on the goods trains of the Gotthard Line."

• **Syrian Railways:** Use radio teleprinter for long-distance communication between two fixed installations about 500 km apart. Extension is planned.

• **Viet Nam Railway System:** Radio telephone and radio Morse circuits are in use as a replacement of wire lines destroyed during the civil war (1945–53) and as a means of long-distance communication between main operating centers and Saigon headquarters. Plans include single-side-band equipment installed on trains as a first stage; and, as a second stage, the installation of a complete network of RT and RP circuits linking all stations as a dispatching medium, and conversion of the long-range network to SSB radio.

• **EF Vitória a Minas (Brazil):** Radio is presently in service on 15 locomotives, with three central installations, for control of three main yards—Vitória, Governador Valadares and Itabira. Portable sets are used, all operating in the 155.610-mc band and supplied by Motorola. A low-frequency system is planned for train-wayside communication, and extension of the present system is contemplated to cover the entire line, 570 km, for dispatching purposes. Under these plans a total of 55 locomotives and 15 cars are to be radio-equipped, and the total number of portable sets is to be increased to 36.

●

Altogether, 63 railways replied to the survey. Of that number, 36 presently use radio for one purpose or another. An additional 11 lines, which do not utilize it now, either plan to inaugurate its use in the near future, or are actively studying its possible application. The other 16 neither use radio nor plan to do so.

Railways which answered all questions fully listed a total of about 8000 radio sets in use, including 1413 fixed stations; 2780 portable sets, and 2748 installations in locomotives. Other sets included 509 in non-locomotive rolling stock; 120 in service and maintenance rolling stock; and 372 in road vehicles. There were 66 sets reported in marine equipment—as to which only a few railways gave specific information.

Of the railways using radio, 21 employ it for classification-yard communication in a total of 324 yards. (One railway not included in the total uses radio in "all" yards but did not give a figure.)

End-to-end train radio is in use on seven lines, planned on several others, and has been used experimentally on two or three railways which do not plan its immediate use.

Wayside-to-train radio dispatching is in use over a total of 2569 km (plus 550 km in emergencies only) on six railways; another seven plan such use of radio on at least 2648 km. Four railways handle substantially all telecommunication by radio, and an additional three plan virtually complete conversion to radio in the near future.

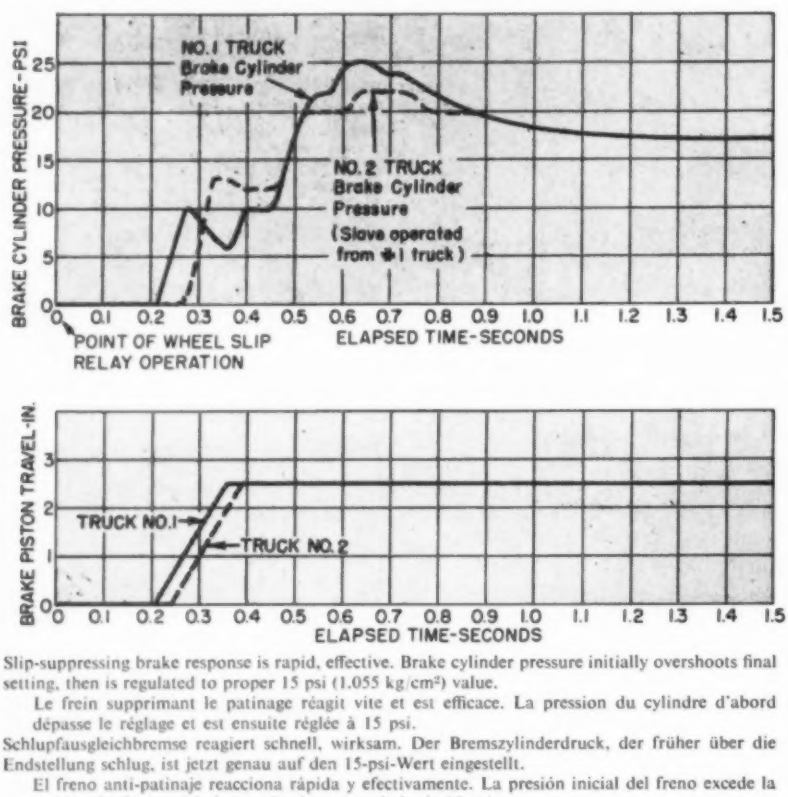
Clearly, the use of radio communications is growing; in addition to the railways planning to inaugurate use of radio, 22 of the 36 lines now using it plan to extend or improve present facilities.

The slip-suppressing brake has been tested on two U25B locomotives which General Electric put on the road last summer.
Le frein supprimant le patinage a été essayé l'été dernier sur deux locomotives U25B de service par General Electric.
Die Schlupfausgleichbremse wurde an zwei Lokomotiven ausprobiert, die General Motors letzten Sommer in Betrieb stellte.
El freno anti-patinaje se ha probado en dos locomotoras U25B de la General Electric, el verano pasado.

Brake Applications Limit Wheel Slip

Correction of wheel slip on American diesel-electric locomotives has usually been some scheme for automatically reducing or completely removing power from, and reapplying it to, traction motors. Single-unit electric locomotives in Switzerland have employed a so-called anti-slip brake, a manually operated system for wheel-slip correction.

This device, now known as the slip-suppressing brake, has been adapted for American application and installed on the General Electric Company's 2,500-hp U25B diesel-electric locomotive.



Slip-suppressing brake response is rapid, effective. Brake cylinder pressure initially overshoots final setting, then is regulated to proper 15 psi (1.055 kg/cm²) value.

Le frein supprimant le patinage réagit vite et est efficace. La pression du cylindre d'abord dépasse le réglage et est ensuite réglée à 15 psi.

Schlupfausgleichbremse reagiert schnell, wirksam. Der Bremszylinderdruck, der früher über die Endstellung schlug, ist jetzt genau auf den 15-psi-Wert eingestellt.

El freno anti-patinaje reacciona rápida y efectivamente. La presión inicial del freno excede la presión final, se regula luego al valor apropriado de 15 psi.

In correcting wheel slip, there is a basic difference between the slip-suppressing brake and the traditional arrangements for reducing power. When one of a locomotive's axles is slipping it is running faster and at lighter load than those which are not slipping. Because the slip-suppressing brake is applied equally to all axles, maximum power is absorbed from the slipping axle and minimum power from the non-slipping axles.

Power reduction decreases the input to all axles proportionally and, therefore, takes the least power from the slipping axle because it is already only lightly loaded. With the slip-suppressing brake there is minimum disturbance of engine output. When the slip is corrected, the locomotive is once more delivering full horsepower with minimum loss of time.

The slip-suppressing brake employs most of the regular air-brake system. The truck (bogie) brake arrangement is unchanged. On the locomotive platform a relay valve is placed as close as possible to each truck and connected to it with a large, short pipe to insure application in minimum time. The relay valves are supplied with air at 140 psi (9.844 kg/cm²) from the main reservoir and are actuated by an air signal. The pressure which comes to them through the control pipe is promptly reproduced in volume in the brake cylinders. This is the way normal brake applications are made.

All the equipment on the locomotive is necessarily well maintained for the basic function of mechanical braking. The added brake devices for the slip-suppressing brake are low in cost, few in

number, extremely reliable in operation, and require maintenance only when other air brake devices receive maintenance. The slip-suppressing brake function involves relatively light duty for the brakes and results in only negligible increase in wheel and brakeshoe wear. It does not increase the over-all duty on the compressor appreciably. An individual application consumes only 16 cu ft (453 m^3) of air. Succeeding slips require less air because the time delay reservoir will be charged. A slip every five seconds, a highly improbable maximum, results in less than 20 per cent load for the compressor.

To achieve slip suppression, a 15-psi (1.055-kg/cm^2) signal is fed to the relay valves. This is introduced through a shuttle valve, sometimes called a double check valve. It resembles a pipe tee with the central leg feeding the relay valve control line. The shuttle signals the relay by moving to connect one or the other of the legs of the tee, whichever has the higher pressure. A 15-psi pressure is produced by a specially-designed pressure regulating valve. This is connected to the locomotive air supply and is turned on and off by a magnet valve.

The pressure regulating valve is designed to provide the fastest possible application of the slip-suppressing brake by deliberately letting the control pressure overshoot momentarily and then bringing it back to 15 psi. While the magnet valve is closed, no air is flowing and the pressure regulating valve is in wide open position.

When the magnet valve opens, high-pressure air rushes through the pressure regulating valve and into the relay valve. A corresponding surge of high-pressure air enters the brake cylinders to start the pistons and brake shoes. The regulating valve senses its output pressure through an orifice. Orifice size has been chosen experimentally so the rush of air is cut off at about the time the brake shoes hit the wheels. The pressure then levels off and is regulated at 15 psi. If the brakes are adjusted for minimum travel, a slight overshoot in pressure may occur for a short time, but this does no harm.

Should the regular brakes be applied at any time while the slip-suppressing feature is functioning, the shuttle valve changes position as soon as the pressure in the control line exceeds 15 psi and the regular air-brake control takes over. It also prevents loss of brakes if trouble develops in the slip suppressing devices.

In Europe, locomotives are used as single units, and the operator is expected to respond to any slipping which may occur. In many cases, he knows his route

CONTINUED

Dispositifs de Freinage pour Restreindre Patinage des Roues

Le frein dit anti-patinant, un dispositif manuel pour corriger le patinage des roues, utilisé en Suisse sur des locomotives électriques à élément simple, a été adapté pour les Etats-Unis. Il assure le fonctionnement entièrement automatique d'un "frein supprimant le patinage", basé sur un système sûr de détection de patinage. Ce frein spécial utilise en grande partie le système ordinaire du frein pneumatique. Les dispositifs supplémentaires ne coûtent pas cher, il en faut peu, absolument sûrs dans leur fonctionnement et n'exigent de l'entretien que lorsque les autres pièces des freins sont soignées. Le système complet monté sur deux locomotives diesel-électriques General Electric 2,500 CV U25B a été essayé pendant sept mois sur 14 lignes principales aux Etats-Unis. Les deux locomotives ont fait le service de train piggyback à vitesse élevée, aux trains de marchandises de grande vitesse et le travail lourd à petite vitesse. On prétend que le frein supprimant le patinage est efficace à n'importe quelle vitesse de la locomotive.

Contrairement au sable que ne reste pas sur les rails à des vitesses élevées, le frein fonctionne toujours et partout et en outre détruit tout film glissant sur roues ou rails.

Bremsvorrichtungen beschränken Radschlupf

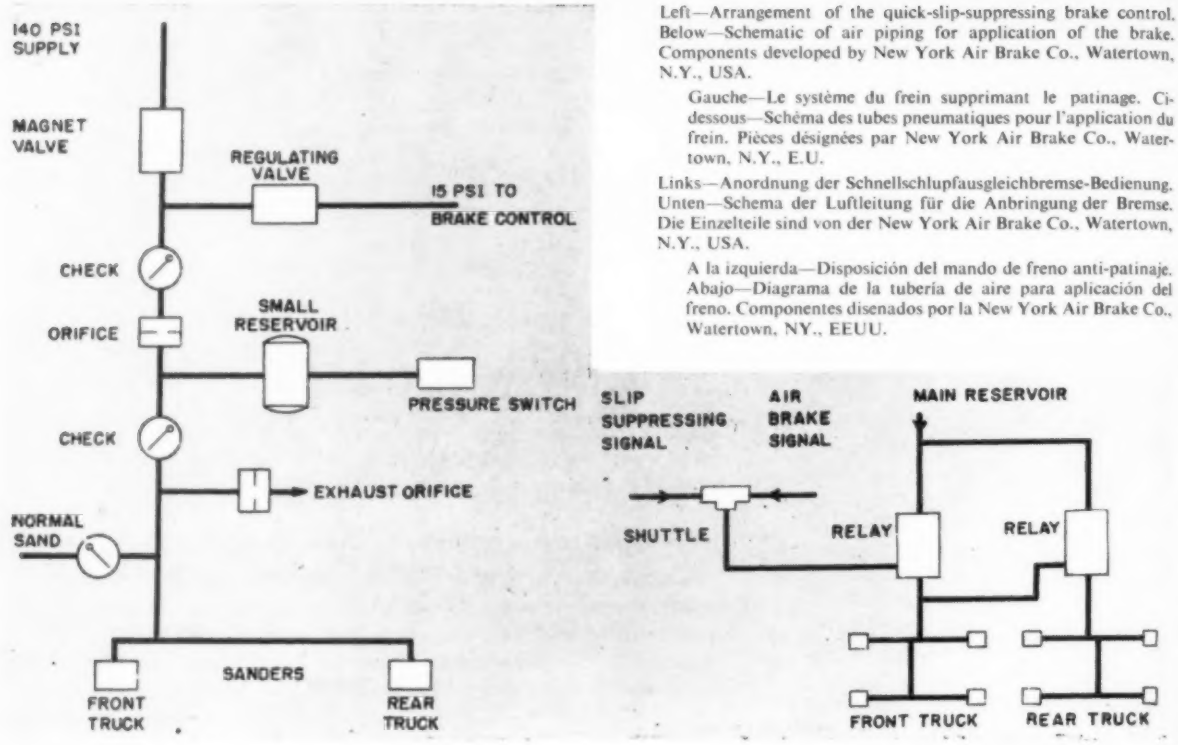
Die sogenannte Gleitschutzbremse, eine handbetätigte Art des Radschlupf-Korrekturgerätes, das in der Schweiz bei eingliedrigen Elloks verwendet wird, wurde der amerikanischen Betriebsverwendung angepasst. Es ermöglicht eine völlig automatische Bedienung einer Schlupfausgleichbremse, die auf einem zuverlässigen Schlupfermittlungssystem beruht. Die Schlupfausgleichbremse wirkt zum grössten Teil auf das reguläre Druckluftbremssystem. Es wird gesagt, dass die wenigen Zusatzgeräte wenig kosten, zuverlässig im Betrieb sind und keine weitere Wartung fordern als die anderen Teile der Luftdruckbremse. Das vollständige System wurde auf zwei dieselelektrischen Demonstrationslokomotiven, Type U25B—2.500 PS, von General Electric angebracht; sie waren in Amerika sieben Monate auf 14 Hauptstrecken in Betrieb. Die Aggregate wurden bei sehr schnellen "Huckepack"-Zügen, konventionellen Güterzügen und auch im langsamen, schweren Rangierbetrieb verwendet. Es wird behauptet, dass sich die Schlupfausgleichbremse bei jeder Lokgeschwindigkeit bewährt.

Nicht wie Sand, der sich bei hohen Geschwindigkeiten nicht auf den Schienen hält, ist die Bremse immer wirksam wo sie gebraucht wird; ausserdem hat sie noch den Vorteil, die schlüpferige Schicht auf Rädern und Schienen zu beseitingen.

Frenos anti-patinaje

El freno anti-patinaje, tipo de un dispositivo correctivo de mano empleado en Suiza en locomotoras eléctricas ha sido adaptado al uso norteamericano. Proporciona una operación enteramente automática del freno "anti-patinaje" y se basa en un sistema seguro de detección patinaje. Tal freno emplea la mayor parte del sistema de freno neumático. Los dispositivos adicionales son baratos, su cantidad es pequeño, son de operación segura y no necesitan más mantenimiento que los otros componentes del freno neumático. El sistema completo incorporado en dos modelos de locomotoras diesel-eléctricas de 2500 CV U25B de la General Electric se ha probado durante 7 meses de operación en 14 ferrocarriles en los EEUU. Las unidades estaban montadas en trenes a caballo de alta velocidad, trenes de cargo convencionales y operaciones de arrastre pesadas. Se dice que el freno anti-patinaje es efectivo a cualquier velocidad.

A diferencia de la arena que no se queda en los rieles a velocidades elevadas, el freno funciona siempre y tiene la ventaja adicional de destruir toda capa resbaladiza en las ruedas o los rieles.



Left—Arrangement of the quick-slip-suppressing brake control. Below—Schematic of air piping for application of the brake. Components developed by New York Air Brake Co., Watertown, N.Y., USA.

Gauche—Le système du frein supprimant le patinage. Ci-dessous—Schéma des tubes pneumatiques pour l'application du frein. Pièces désignées par New York Air Brake Co., Watertown, N.Y., E.U.

Links—Anordnung der Schnellschlupfausgleichbremse-Bedienung. Unten—Schema der Luftleitung für die Anbringung der Bremse. Die Einzelteile sind von der New York Air Brake Co., Watertown, N.Y., USA.

A la izquierda—Disposición del mando de freno anti-patinaje. Abajo—Diagrama de la tubería de aire para aplicación del freno. Componentes disenados por la New York Air Brake Co., Watertown, NY., EEUU.

so well that he is able to anticipate slipping. He presses a button which actuates the magnet valve and slip-suppressing brake.

While the U25B locomotive has such a push button which may be used by the operator, the prevalence of multiple-unit locomotives on American railroads make it necessary to provide also for completely automatic operation of the slip-suppressing brake.

For automatic operation, a dependable slip-detection system is necessary. The U25B is equipped with the GE adhesion loss detection system. A small, sturdy alternator is installed on each axle. Outputs of these are compared continuously, and difference in speed of the several axles produces a signal.

If the locomotive is operating under power when a slip is detected, several things occur automatically on the slipping unit before the operator's warning light and buzzer come on. This time delay is intentional. It is recognized that enginemen on most locomotives have not been aware of the great amount of slipping which occurs when a locomotive is traveling at high speed. Because most slips can be corrected automatically, it is considered better not to call them to the attention of the operator. When several units are operating in multiple, it is an advantage to have each unit take care of its own slipping.

The adhesion loss detector works equally well at all locomotive speeds. This is particularly important on a high-horsepower locomotive where undetected slips at high speed might continue for miles. Such a condition would involve loss of horsepower, damage resulting from over-speeded traction motors, and sometimes motor and generator flash-overs.

Quick slip detection and prompt slip correction help keep traffic moving at top speed. Detection of very small differences in axle rpm is not practicable. Allowance must be made for differences in wheel size.

The standard adhesion loss detector was modified to determine axle acceleration as another means of detecting slip. A rate of acceleration was chosen that is a little above the maximum acceleration that might be experienced for the whole locomotive in special service—such as kicking cars. Use of the acceleration feature to detect slipping is especially valuable when slips occur suddenly. This feature permits correction sooner and before the rapidly accelerating axle can reach such a high speed that appreciable time would be required to bring it back into rolling contact with the rail.

In some cases, slip does not occur suddenly and acceleration might not be sufficient to give an indication. The speed differential feature then comes into action and the slip is corrected. In such cases, excessive speed is not a problem and, because adhesion is partially effective, the loss of tractive effort is minor.

Whenever slipping results in rapid acceleration or produces the selected difference in axle speeds, a sensitive relay operates in a few milliseconds, and, in a tenth of a second, the contacts of a power relay close and several slip corrective measures are initiated. Initially, the slip-suppressing brake is applied on both locomotive trucks in less than one-half second. This corrective action is so prompt and so effective that most slips are arrested and the full pulling power of the locomotive restored in a matter of two or three seconds.

The U25B locomotive control is also designed to take care of exceptional conditions. The magnet valve which actuates the slip-suppressing brake also feeds 140-psi (9.844-kg/cm²) air through an orifice into a small reservoir, which continuously discharges through a small outlet orifice, providing a time delay system. In case a slip lasts as long as three seconds, air pressure builds up to a point which initiates sanding, and the closing

of a pressure switch actuates the light and buzzer in the operating cab.

This is the first warning that the operator has that one of his locomotive units is slipping. It also tells him that the slip-suppressing brake has been applied, that automatic sanding is taking place, and that the power of the slipping unit is being gradually reduced. After the operator has become accustomed to this system, he will know that he can wait to see what happens next. With experience, he will develop judgment to decide whether he need take any action. When the slip signal stops, the brake, buzzer, and light are all cut off. This occurs while there is still a speed difference of a few miles per hour between the various locomotive axles, so automatic sanding is continued briefly until the pressure in the small reservoir leaks off.

The same signal which quickly applies the slip-suppressing brake and, after a time delay, provides automatic sanding, simultaneously reconnects the excitation circuits to reduce power on the unit which is slipping. The exciter field current is reduced as the magnetic flux in the exciter decays and this, in turn, reduces the main generator field current as the magnetic flux in the main generator decays. Since both fields normally operate in a somewhat saturated state and one follows the other, only a small gradual reduction in traction motor current results.

The overriding solenoid in the engine governor is also energized in such a way that it moves the load control potentiometer toward minimum field. Its movement from maximum field position to minimum field position takes about 20 seconds. Generally, the prompt application of the slip-suppressing brake with the occasional help of automatic sanding corrects slips so rapidly that there is very little reduction in engine output.

When the operator chooses to notch back on the throttle, power on all units will be reduced. This reduction will be greater on units on which the load control rheostat has already reduced power than on units which are not slipping. Under such circumstances, the operator, guided by experience, should reduce power slowly. As soon as the slip indication ceases, the throttle should be opened to increase power as track conditions permit.

It is considered preferable to initiate an application of the slip-suppressing brake on all axles of the unit when only one axle is slipping. When one axle slips, the power it loses is transferred to the axles that are not slipping. Their tractive effort and tendency to slip are increased. Because engine output tends to remain constant as a result of load control action, application of the slip-suppressing brake to all the axles tends to prevent the slipping of those axles on which the tractive effort increases while simultaneously reducing the speed of the slipping axle.

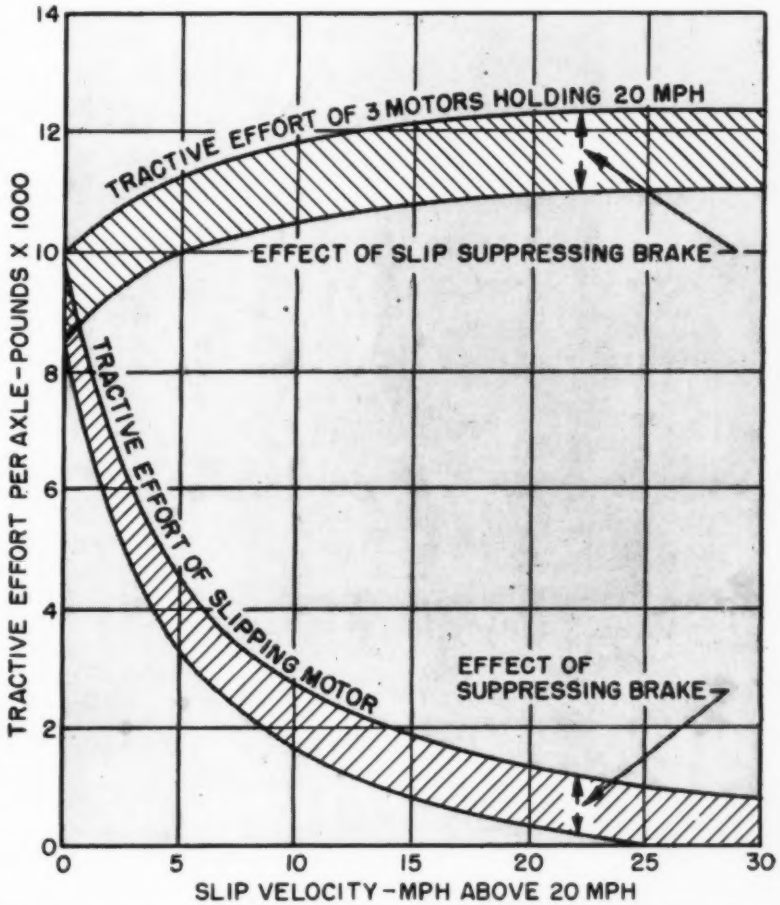
A slippery film may develop on the locomotive drivers as well as on the rail. Rail adhesion is spotty, and the film on the wheels may sustain slipping from one slippery spot to the next. The action of the slip-suppressing brake in destroying the film and cleaning all the wheel treads, at the same time that it is bringing the slipping axle into normal rolling contact with the rail, can restore full pulling power between slippery spots and facilitate getting the train over the railroad in minimum time.

It is simpler to actuate the slip-suppressing brake on all axles when a slip is detected than it would be to try to single out and apply the brake to the axle which might be slipping at that instant. The simplest arrangement produces the most satisfactory result.

Wheel slips can be detected and corrected without drastically disturbing or upsetting the electric transmission system or the engine governing system of the locomotive. This minimizes the possibility of recurring slips resulting from the way power is reapplied, thus insuring that locomotive output can be maintained to keep the train up to speed.

The slip-suppressing brake is effective at any locomotive speed. Moreover, contrasted with sand, it is always effective where it is wanted. Difficulty is often experienced in keeping sand on the rail at low speed. At high speed, this may become practically impossible.

The foregoing article is based on a report by J. C. Aydelott, General Electric Company, Erie, Pennsylvania, USA.



Slipping characteristics and effect of brake during slip with 2,500 hp for traction and all four motors in parallel. One motor is slipping; three are holding a constant 32.2 km/h.

Caractéristiques du patinage et l'effet du frein au cours du patinage à 2500 CV pour traction et les quatre moteurs en parallèle. Un moteur patine; trois maintiennent 32.2 km/h.

Schlupf-Charakteristiken und Bremswirkung auf den Schlupf, bei 2,500 Ps Betrieb und allen vier gleichgeschalteten Motoren. Ein Motor schlupft; drei halten ständig 32.2 km/h.

Curvas características de patinaje y efecto de freno durante un patinazo con 2500 CV para tracción y los cuatro motores en paralelo. Un motor está patinando, tres continúan a 32.2 km/h.

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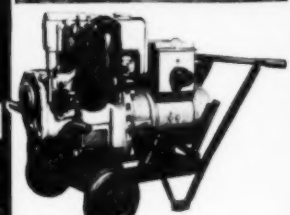

The new 3,000-watt Kango Portable Diesel Generator is so light it can be wheeled with ease. It takes only two men to carry it and weighs only 250 lbs. (111.5 kgs). This specially designed lightweight generator is powered by a HATZ E.75 lightweight 4-stroke high speed diesel. The generator can be supplied for either 110 volts or 240 volts DC or 50 cycles AC and powers four Kango Ballast Tampers at one time.

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Tokyo Subway Gets New Stainless Steel Cars

Sixteen stainless steel rapid transit cars have been delivered to the newly constructed Hibiya (#2) Line of the Teito Rapid Transit Authority (Tokyo Underground Railway).

These are the first of a total of 240 subway cars for the line and were built by Kisha Seizo Kaisha and Tokyu Sharyo Kaisha. All 240 cars will be delivered by the time the #2 line is completed in March, 1964. They all will be of the stainless steel variety. The color scheme of the cars will identify each TRT line as follows:

#2: Hibiya Line: Silver or stainless steel finish
#3: Ginza Line: Yellow
#4: Marunouchi Line: Scarlet

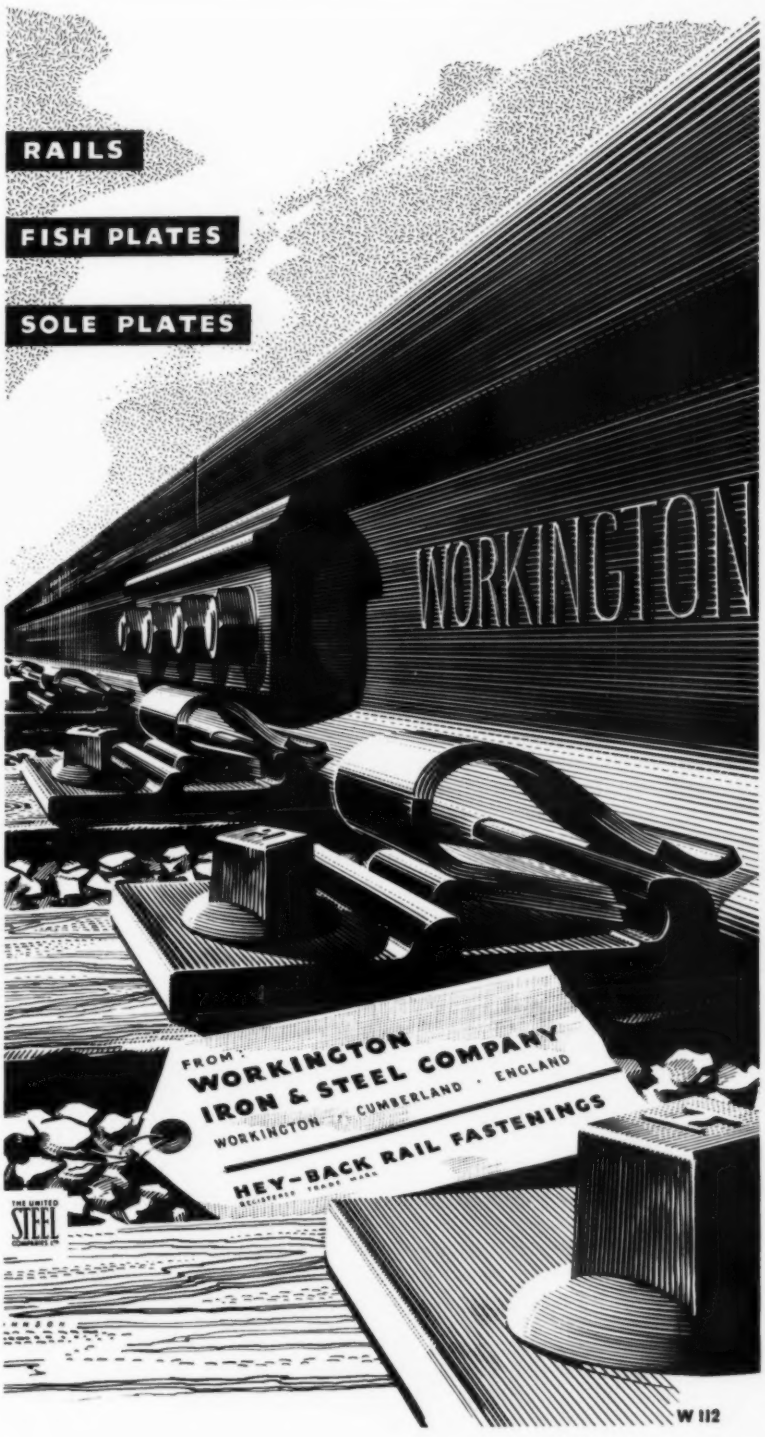
These cars for the #2 line will be used in through operations from TRT's line to the surface section of the privately-owned Tobu and Tokyu suburban railways. Consequently, a pantograph is applied as the collector instead of a third-rail shoe as on TRT's existing #3 and 4 lines.

Besides the stainless steel finish, these new cars are fitted with automatic train control and a high frequency inductive system wireless telephone to assure safety and smoothness in operation.

These cars were inspired by the 270 stainless steel subway units on the rapid transit system of the city of Philadelphia in the United States.

SPECIFICATIONS

Type of car: Four-wheeled bogie.
Car body, outside: Stainless steel.
Car body, inside: Melamine laminated plastic.
Weight: tare: 32.5–33.0 metric tons.
Capacity: 140 persons. (52 seated, 88 standing).
Gauge of track: 1,067 mm (3 ft. 6 in.).
Electric system: DC 1,500 volts.
Maximum operating speed: 100 km/hour.
Acceleration: Normal: 4.0 km/hour/sec.
Retardation: Normal: 4.0 km/hour/sec.
Emergency: 5.0 km/hour/sec.
Maximum length, width and height:
18,000 mm × 2,790 mm × 3,600 mm (3,995 mm when pantograph extended).
Distance of bogie center: 12,000 mm.
Height of floor surface: 1,125 mm.
Draft gear: Automatic. Driver's end: Pull-out type of special design.
Intermediate: Permanently coupled bar with ball joint.
Coupler height: Driver's end: 800 mm.
Intermediate: 750 mm.
Bogie: Air suspension, all-welded construction.
Wheel base of bogie: 2,100 mm.
Diameter of wheel: 860 mm.
Traction motor: 100 hp × 4. Fully sprung. DC series with shunt field.
Power transmission: W-N type.
Controller: Acceleration adjusted by load-variation system, pattern control with dynamic brake.
Brake: Combined automatic and straight, interlocked with A.T.C. and adjusted by load-variation.
Automatic train control: High frequency, continuous inductive system.
Collector: Pantograph.
Ventilator: Roof-mounted fan, 6 in number, 40 cm in diameter.



Speed ramps—moving belts from street to elevated station—will carry passengers to and from monorail trains at Seattle terminal.
Des trottoirs roulants transporteront les voyageurs de la rue vers les trains monorail et vice versa à la gare terminus de Seattle.
Schnellrampen—Rollbänder von der Strasse zum höher gelegenen Bahnhof—werden Reisende von und zu den Monorail-Zügen in Seattle bringen.
Rampas rápidas—cintas transportadoras de la calle a la estación elevada— llevarán a los pasajeros a los trenes monocarril en la estación terminal.

Alweg Monorail for Century 21

The full-scale Alweg monorail system now under construction in Seattle, Washington, USA, will be capable of carrying 10,000 passengers per hour between down-town Seattle and the Century 21 Exposition, a world's fair scheduled to open in April 1962 (IRJ "World Report," March, p. 7; "World Market," April, p. 7). The 1.6-km route will be a double-track line with two trains of four cars each to operate in shuttle service on separate tracks.

Details of the monorail system have been made public by Sixten Holmquist, managing director of the Alweg Corporation in Seattle and New York. Appearance of the proposed line is shown in retouched photographs of Seattle streets reproduced above. Test operation of both trains and track is expected to begin directly after completion of the system in November 1961.

The rubber-tired, four-car articulated trains will be 36.6 m long and 3.048 m wide. Each train will consist of a pair of two-car units joined by short-type rod couplings. The cars will be connected with each other by sliding doors and rubber-skin gangway diaphragms. The four cars will have a total of 124 seats, and a maximum capacity per train, including standees, of 450 persons. Total running time between the downtown terminal and the Exposition grounds will be 95 seconds.

The downtown Seattle station will have two outside loading platforms plus a central platform for discharging passengers. Speed ramps—moving belts from street level to the elevated station—will carry passengers to and from the trains. Collection of fares for the monorail ride, admission tickets to the Century 21 Exposition and train maintenance will all be handled at the ground-level terminal at the Exposition grounds.

The dual monorail tracks will be supported by single concrete columns, or piers, spaced approximately 26 m apart on straightaway and 18 m apart on curves. The columns, measuring 1.22 m² at street level, will taper slightly toward the top. The running beam for each train will be 0.9144 m wide and 1.524 m deep. Average clearance under the supporting columns and under the track will be 5 m and 6.4 m, respectively.

Materials to be used in the tracks, columns and terminals will, it is estimated, include 7200 tons of prestressed concrete, 7500 tons of reinforced concrete, 250 tons of structural steel, 600 tons of reinforcing steel and 120 tons of prestressing steel.

Train exteriors will be designed to give an impression of smooth-flowing lines of glass, aluminum and chrome. The car body shell will be made of light-metal alloys joined by welding and riveting, with the exception of some assembly points which will be of welded steel sheets.

Each car will be equipped with roof fans, adjustable sliding panels in the entrance doors and hinged windows in the body side mounted flush with the exterior side-wall sheetings. The hoods of the driver's cab in each car head will be equipped with revolving windows and

The 1.6-km monorail route to fair grounds will be high above city traffic. Tests will begin following completion of system in November 1961.
La ligne monorail de 1.6 km à l'exposition se trouvera loin au-dessus de la circulation. Le système doit être prêt en novembre 1961.
Die 1.6-km Monorail-Strecke ins Grüne liegt hoch über dem Stadtverkehr. Nach Probefahrten folgt Fertigstellung des Systems im November 1961.
El recorrido de 1.6 km del monocarril estará sobre el tráfico de la ciudad. Terminado el sistema en noviembre 1961 ensayos se efectuarán.

Exposition

ventilation slots. The four side doors of each car will be pneumatically operated one-leaf sliding type running on the outside.

Interior lighting is to be provided by two continuous indirect light bands in the ceiling. The installation of a convection heating system with radiators under the seats has been provided for, and the train will also be equipped with a public address loudspeaker system.

Each car body will rest on two running gears equipped with dual load-carrying tires and side wheels for guidance and stabilizing. The running gear is a single-axle bogie consisting of two pairs of upper and one pair of lower side rubber-tired wheels. All eight axles are powered and equipped with a so-called combined brake system. The dynamic brake acts over a speed range from 16.09 km/h and up, whereas the mechanical brake normally only acts between 16.09 km/h and zero. In case of an emergency, the electrical power system will be killed and

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Alweg Monorail pour Exposition Century 21

Le système Alweg Monorail actuellement en voie de construction à Seattle, Washington, E.U., aura une capacité de 10,000 voyageurs par heure sur la ligne de 1.6 km du et vers le centre de Seattle et l'Exposition Century 21, l'exposition universelle à inaugurer en avril 1962. Les voitures seront fournies par Linke-Hoffman-Busch, Allemagne Fédérale. La force motrice sera fournie par General Electric Motors.

Alweg Monorail für die Century 21 Ausstellung

Das vollständige Alweg Monorail System, das jetzt in Seattle, Washington, USA, in Bau ist, wird imstande sein, stündlich 10.000 Passagiere auf der 1.6 km Strecke von und zur Vorstadt Seattle sowie zur Century 21—Ausstellung zu befördern. Die Century 21 ist eine Weltmesse, die plangemäss April 1962 eröffnet werden soll. Die Wagen, die verwendet werden, sind bei Linke-Hoffmann-Busch mit der Hand gefertigt. Der Antrieb wird von General Electric Motors geliefert.

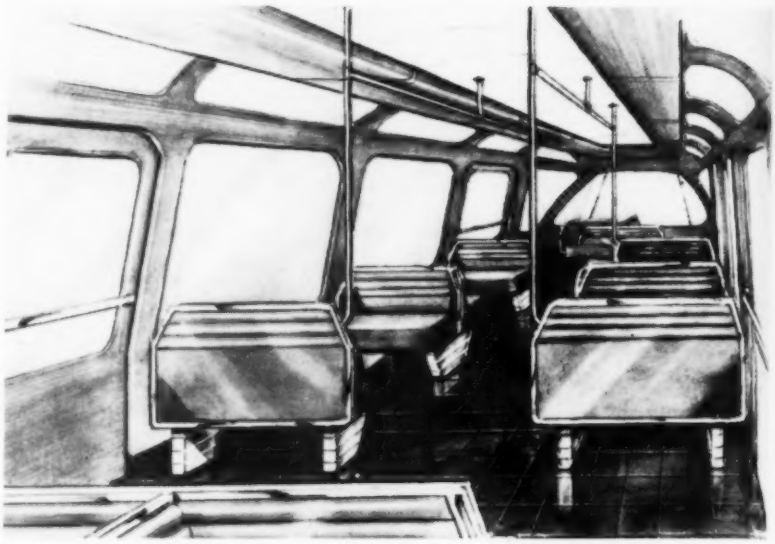
Monocarril Alweg para la Exhibición Century 21

El sistema de monocarril Alweg que se construye hoy en Seattle, Washington, EEUU, podrá transportar 10.000 pasajeros por hora en el recorrido de 1,6 km entre Seattle y la Exhibición Century 21, una feria mundial que se inaugurará en abril 1962. Los vagones para el sistema serán fabricados por Linke-Hoffman-Busch de Alemania occidental. General Electric Motors suministrará la fuerza motriz.

the mechanical brake alone will fulfill the brake requirements.

The trains will be powered by two sets of General Electric 100-hp motors on each car. Each set of motors will have a separate power pick-up.

Alweg Rapid Transit Systems of Washington State, Inc., prime contractor for the project, as well as its designer and supervising coordinator, will operate the completed system from April 1962 to June 1963. The Howard S. Wright Construction Company of Seattle is building the structure. The driving mechanism, braking system and other mechanical components will be manufactured in the United States. Downtown station speed ramps are being designed by the Stephens-Adamson Company, Chicago, Illinois, and the pneumatic tires by Firestone Tire & Rubber Company. The cars, being hand-crafted by Linke-Hoffman-Busch in West Germany, will feature modern decor and electronic equipment.



Each of the four-car articulated trains will seat 124 persons; total capacity will be 450.
Chaque train articulé à quatre voitures aura 124 places; capacité totale 450 personnes.
Jeder der viergliederigen Züge hat 124 Sitze; Gesamtleistung 450 Plätze.
Cada uno de los trenes articulados tendrá asientos para 124 personas; capacidad total 450.

Monorail: Past Performance and Present Potential

Monorails have been in existence, at least in experimental forms, as long as conventional two-rail systems, and have carried passengers, freight and mixed consists.

There are two basic types of monorail: the suspended, in which cars swing from an overhead rail; and the supported, in which cars straddle the rail.

• One suspended monorail line—the 13.2-km Wuppertal Schwebebahn in Germany, built in 1901—has carried over 1,000,000,000 passengers and is still a profitable operation. It is reported to have an enviable record for safety as well as performance.

• A full-size supported Alweg-type system has had extensive tests on 2 km of demonstrator track built near Cologne, West Germany, in 1957. Articulated trains of two cars operate successfully over three turns and a 15 per cent grade. Speed is 80.45 km/h, with more than 240 km/h claimed.

• In Japan, a suspended monorail experiment uses rubber for both running and guide wheels. The train is operated at the Tokyo Zoological Garden by the Traffic Bureau of the Tokyo Metropolitan Government.

• The first monorail trains to operate on a daily basis in the USA have been in service since June 1959 on the Disneyland Alweg monorail system at Anaheim, California. The system, approximately 1.6 km long, consists of two three-car articulated trains, each with a capacity of 82 passengers. Electrically operated and running on rubber tires, the trains move over a concrete beamway supported by cement pylons at heights up to 10.4 m. The Disneyland-Alweg monorail system was purposely designed and developed to include curvatures of 36.6-m radius, overpasses, radial turns and grades of 7 per cent, to demonstrate the practicability of this system under different construction and topographic conditions. The operation has proved to be more than an interesting installation providing a panoramic view of a world-famous amusement park. For about two years it has demonstrated and tested a new technical development, complete with track, cars, signal system, and a heavy-duty operating schedule with substantial passenger loads. A 2.6-km addition to the system, which is expected to begin operation in May 1961, will extend the line out of Disneyland proper, direct to the Disneyland Hotel, and will operate trains at speeds of 72 km/h.

• The Italian Exposition at Turin, Italy, scheduled to open early in May 1961, will feature a single-track 1.2-km Alweg monorail system which will be serviced by one three-car train running between the main entrance of the fair and the main exposition building.

• Some other Alweg monorail installations currently under study:

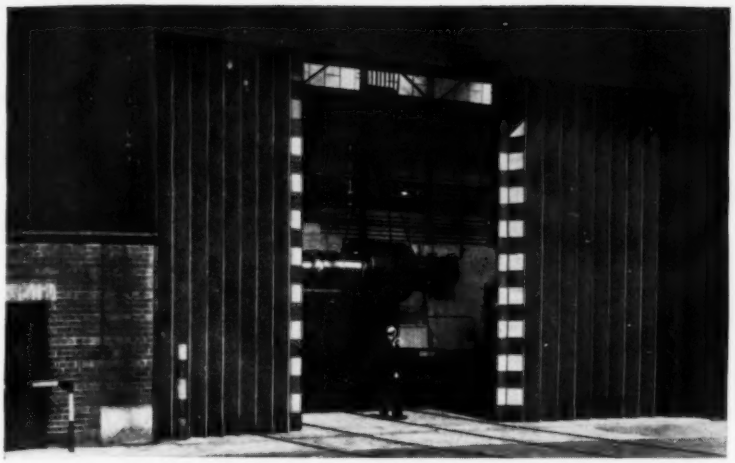
AUSTRIA—Approximately 4.8 km of monorail proposed and under consideration within Vienna.

BRAZIL—Monorail continues to be a possibility for rapid public transit in Sao Paulo and Rio de Janeiro.

ENGLAND—Studies continuing of possible monorail installation from London proper to airport.

WEST GERMANY — Comparison studies between Alweg monorail system and conventional subway system for rapid transit being made for Frankfurt-am-Main.

JAPAN—Construction of a supported-type monorail overhead railway between Tokyo and the Heneda airport has been proposed by Hitachi, Ltd., Japanese engineering firm and rolling stock manufacturer, following completion of a technical licensing agreement with Alweg.



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by Hermann S. D. Botzow, Jr.

This recently published book gives an objective view of the potential of monorail tranportation in the United States. Following the introductory section, which traces the history of monorail, the author discusses types, cars, track and structures, stations, wayside equipment, particular monorail characteristics, and the economics of monorail as a means of transportation.

The appendices contain detailed data on constructed and proposed monorails, car characteristics, rail cross sections, rail supports, operating costs, and platform clearance diagrams. The bibliography is probably the most complete of any on the subject.

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After Hours with Jim Lyne

NON-EDIBLE VEGETABLES—In the United States, highway trucks hauling agricultural products and fish are exempt from regulation—hence the temptation for hauliers to disguise loads subject to regulation, and which they are moving without permission, as "exempt" commodities.

One easy disguise is a refrigerated truck—which would not usually be suspect of hauling anything but foodstuffs. But, as a matter of fact, refrigerator trucks have been detected maintaining very low temperatures—for lading of such commodities as steel and matches. One such truck was loaded with illegal immigrants, suffering from frostbite.

TOO MUCH REGULATION—In the US, where all railways are privately owned, it is, perhaps, somewhat of a paradox that governmental policing of rates, service and performance is probably more severe and restrictive than in any other country in the world. Paradoxically, also, the big issue in regulation of rates by government is not the enforcement of maximum "ceilings" on rates, but the prohibition of railway rates which regulators consider to be too low.

Railway costs are, to an important degree, constant (i.e., interest on investment and maintenance of fixed property). In contrast, practically all costs of highway hauliers and barge operators are variable, rising or falling directly with traffic volume. When railways compete with these other types of transportation, it is to their advantage to allow their rates to fall somewhat below their full (including constant) costs, if necessary to win the traffic. So operators of trucks and barges complain to the regulators, asking them to require the railways to set their rates at "fully allocated costs."

Such rate making, of course, tends to divert traffic away from the railways—hence increasing their unit costs on traffic remaining to them. And these higher unit costs give rise to still further demands for higher freight rates.

The situation is just a bit too complex for widespread popular understanding—which gives rise to an attractive opportunity for the propagandist's talents.

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LETTERS TO IRJ

'Excellent Coverage'

New York, N.Y.

To the Editor:

I would like to thank you very much indeed for the excellent coverage you gave the German Federal Railway in the March issue of the International Railway Journal. The article has an extraordinary scope and we certainly appreciate the fine presentation.

Heinz Koch
German Federal Railway

'We Welcome IRJ . . . as an International Forum'

Moscow, USSR

To the Editor:

Upon perusal of the two issues of the International Railway Journal received by us, we welcome this publication and fully share your thought that this journal may become an international forum for the exchange of information on technical and economic problems looming before the railroads of the world.

We believe the publication of an international railroad journal containing material covering the railroads of Europe, Asia, America, Africa and Australia will promote further development of railroad transportation and the cooperation of railroad workers of all continents.

We appreciate your suggestion that we contribute to the work of the journal by illustrating the progress of railroad transportation in the Soviet Union.

Ministry of Transport & Communications, USSR

Ton-Kilometers per Inhabitant — 'A Regular Index'

Rio de Janeiro, Brazil

To the Editor:

I had the chance to look over the February issue of International Railway Journal and was quite surprised to find the mention of my old idea of ton-kilometers per inhabitant (After Hours with Jim Lyne, p. 62). With the valuable support of your paper, I am quite sure that the idea will spread around and become a regular index to estimate railroad transport and economic development ratio. Wishing your paper its deserved success . . .

Renato de Azevedo Feio
Companhia de
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Impression of new Maybach-powered Hymek diesel-hydraulic locomotive.

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Designed specifically for rail traction applications, Bristol Siddeley Maybach* diesel engines operate with a higher rate of availability than any other rail traction diesels. This unique overall efficiency has been achieved by combining in a basic design common to all models, the best qualities of high, medium and low-speed diesel engines—a high power/weight ratio and great compactness, a low fuel consumption throughout the whole speed range, and an exceptionally low rate of wear.

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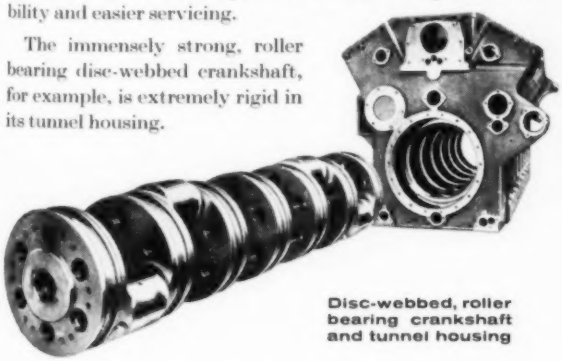
Bristol Siddeley Maybach rail traction diesel engines range from 384 to 2,000 hp and embody design features which also produce more efficient operation in terms of greater reliability and easier servicing.

The immensely strong, roller bearing disc-webbed crankshaft, for example, is extremely rigid in its tunnel housing.



Disc-webbed, roller bearing crankshaft and tunnel housing

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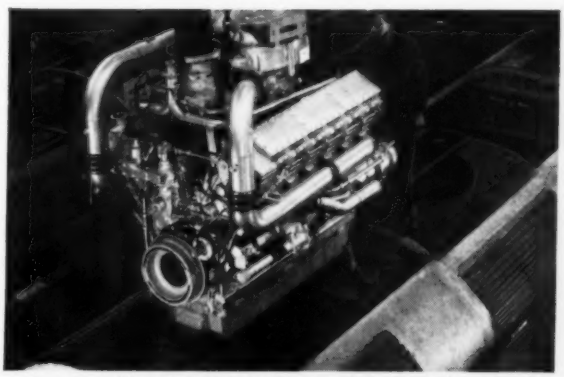

Maybach diesel engine being installed in D800 Class at Swindon.

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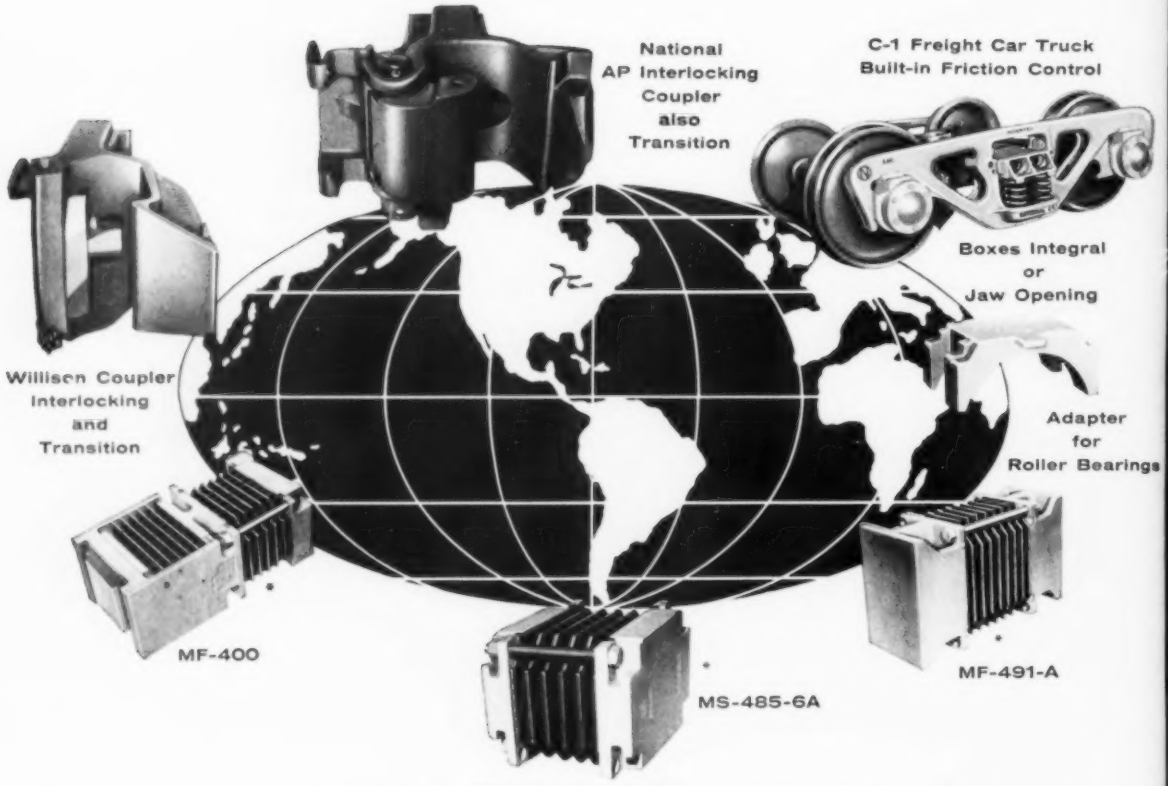

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